Learning from implementation of Integrated Child Health Events: lessons from global practice and the experience of Zambia

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Declaration

I, Mahoko Kamatsuchi, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in my thesis.

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Integrating Statement

I undertook the Doctorate in Public Health (DrPH) degree to strengthen my leadership and management skills and to develop analytical skills in the area of health policy and systems analysis. My ambition is to apply evidence into practice in future management and leadership roles in global health in low- and middle-income countries (LMICs). These skills were acquired through three components: a taught component, an organizational and policy analysis (OPA) project, and a thesis.

I entered the DrPH programme with an interest in investigating how best to deliver primary health care, particularly in countries where the health system, political will and delivery infrastructure are weak, with limited human resources, and without the capacity to manage and deliver essential basic health services to their people. This driving curiosity comes from my experience in working in health programme management in a range of LMICs, such as the Democratic Republic of Congo, Indonesia, Zambia, Mexico, Niger, Tanzania and countries in Latin America and the Caribbean, with UNICEF, World Bank and Harvard School of Public Health.

I undertook seven modules for the **taught component**: three modules were compulsory, and the remaining four were selected based on skills which I deemed necessary to acquire. The compulsory DrPH modules were two modules on Evidence-based Public Health Practice (EBPHP) and one module on Leadership, Management, and Professional Development (LMPD). The EBPHP modules entailed critically appraising studies and translating evidence into effective public health policies and practice. Two assignments strengthened the knowledge gained in these modules: (1) a systematic review of the effectiveness of restrictions on selling tobacco products to minors; and (2) designing an effective knowledge transfer strategy to place exclusive breastfeeding promotion as the top priority on the agenda of the Ministry of Health in Angola.

The LMPD course provided an opportunity to apply organizational theories to real-world public health practice. Through the LMPD assignment, I first applied an organizational change model to a complex organization; I then used relevant organizational theories to describe some of the underlying problems I would face in the organization. Both the EBPHP and LMPD courses enabled me to examine, analyse and apply research findings to real-life scenarios.

The following modules from Master of Science (MSc) courses were also undertaken with the intention of deepening my skills and knowledge. First, Qualitative Methodologies helped me obtain the basic understanding and skills to conduct qualitative research required to conduct the Organizational and Policy Analysis and thesis. Second, the Principles of Social Research module provided me with the knowledge and skills to identify the suitability of various research designs and data collection methods. Third, given the nature of my interest and research area (reduction of child mortality in LMICs), the Maternal-child Nutrition and Nutrition in Emergencies modules yielded up-to-date and cutting-edge knowledge of current thinking and research findings of the topic. I also attended an additional training module in Infectious Diseases in Emergencies and a range of courses in the Transferrable Skills Programme (TSP) to bring in skills and knowledge on specific issues that would be useful in writing up my thesis and later in my career.

Organizational and Policy Analysis (OPA) project, the second component of the DrPH, was undertaken at Save the Children-United Kingdom (SCUK) in London, UK, from July to October 2009. The reasons for selecting SCUK as host institution for the OPA were due to my interest in working and learning from a large-scale international non-governmental organization actively involved in advocating for the protection of the lives of children, and the researcher's familiarity with the nature of SCUK's work in the field. Most importantly, the major strategic shift SCUK was going through provided an excellent opportunity to analyse a process of institutional reform from an organizational effectiveness perspective, and in real time.

I analysed SCUK processes of adopting a newly introduced newborn-child survival (NCS) strategy and explored the factors which supported or inhibited the health team within the policy department to adopt and deliver the NCS strategy as an organizational priority. Applying knowledge and frameworks learned from the EBPHP, Qualitative Methodologies and Principles of Social Research modules, I collected data by conducting semi-structured interviews, non-participant observation and document review to gain insight into the internal and contextual factors that facilitated or hindered the implementation of the NCS strategy in SCUK.

The skills and experience gained through coursework and the OPA project involving qualitative research provided me with a better understanding of the challenges faced by SCUK in having the various internal elements aligned before implementing an effective organizational priority change. These included, in particular, ensuring adequate staffing and skills, obtaining coherence in programmatic strategies with the wider organizational context, and ensuring close communication and contact with their country offices. I was able to provide practical suggestions to the organization, especially to the health section and policy department, about approaches to respond to the expectations placed upon them.

The **thesis**, as the third DrPH component, has its roots in my experience and interest in effectively delivering primary health care (PHC) through integrated child health events (ICHEs); a terminology I developed for the thesis. I used an adapted implementation research framework that underpinned the thesis, and conducted a quantitative analysis to analyse ICHEs globally, and a qualitative assessment of a country case study, Zambia. The skills in conducting qualitative research gained from the Qualitative Methods course, and the experience gained from conducting semi-structured interviews and triangulating data from various sources for the OPA project, strengthened my research and analytical skills that contributed to the qualitative component of the thesis. The skills gained from TSP on using NVivo, the qualitative data analysis computer software, allowed me to organize, code and analyse large amounts of data collected during the fieldwork in Zambia. The quantitative analytical

skills I gained in my Master of Public Health course at Harvard University and through the TSP enabled me to conduct statistical and descriptive analyses using Stata and Excel.

The thesis provided me with a better understanding of the magnitude of ICHEs in LMICs, and the complexities of finding effective models of child health service delivery. I was able to understand the dilemma policy-makers face when needing to make difficult decisions, in terms of relying on nationwide campaigns to obtain quick results by delivering life-saving services to children, or taking a more comprehensive but a longer route by investing in strengthening the health system to ensure a more stable provision of health services in the future.

Throughout my extensive study, and the various skills acquired through the DrPH programme, I believe I have gained important knowledge and critical skills that I will bring with me when pursuing future leadership roles in the global health field. This will significantly contribute to my aspiration of making a contribution towards improving the health and well-being of women and children in LMICs.

Abstract

Background. Integrated child health events (ICHEs) are an established and popular mechanism for delivering essential health interventions in low- and middle-income countries (LMICs) suffering resource constraints and health system deficiencies. There is scarce empirical research on whether their expansion and addition of multiple components affect coverage, on the institutional capacities and processes required to support these, and on their implications for routine delivery of immunization.

Aim. To examine whether delivering multiple interventions through campaign-style events is an effective strategy in LMICs, given the drive towards expansion of this delivery strategy, and the need to sustain and strengthen routine immunization systems in the long-term.

Methods. Guided by an implementation research framework, the study involved a quantitative analysis of a global ICHE dataset, and a qualitative case study of CHWk in Zambia (1999-2014) including semi-structured interviews and document reviews. Zambia represented a unique case as it has consistently relied on campaigns with larger numbers of interventions per event than elsewhere.

Findings. ICHEs represented an effective platform with a potential to incorporate multiple key interventions globally without necessarily compromising their coverage. Political stability, government stewardship, high levels of collaborative action and coordination, and the institutionalization of CHWk in Zambia provided a solid base for expansion. Lack of financial and human resources to strengthen district health management fostered a reliance on CHWk to deliver routine immunization. An abrupt top-down policy shift to de-emphasize CHWk, and insufficient local buy-in, in effect obstructed the move towards re-building routine systems.

Conclusions. ICHEs continue to play a major role in delivering multiple essential child health interventions in many LMICs. Given their potential to undermine routine immunization systems, a synchronised approach of continued delivery of key services through campaigns in targeted areas, in parallel with strengthening routine delivery, is a viable strategy in pursuing child mortality reductions in the long term.

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List of Abbreviations

BCC	Behaviour change communication
BCG	Bacillus of Calmette and Guérin (tuberculosis vaccine)
CDC	Centers for Disease Control and Prevention
CEE/CIS	Central and Eastern Europe / Commonwealth of Independent States
CFR	Case fatality rate
CHA	Community Health Assistant
CHD	Child health day
CHTC	Child Health Technical Committee
CHWk	Child Health Week
CIDA	Canadian International Development Agency
CIDRZ	Centre for Infectious Disease Research in Zambia
DFID	Department for International Development (United Kingdom)
DHS	Demographic health survey
DPR	Democratic People's Republic (Korea)
DPT	Diphtheria, pertussis, tetanus toxoid vaccine
DR Congo	Democratic Republic of Congo
DW	Deworming
EID	Early infant diagnosis (of HIV)
EPI	Expanded Programme on Immunization
ESAR	Eastern and Southern Africa Region
FP	Family planning
GAVI	The Global Alliance for Vaccines and Immunization
GDP	Gross domestic product
GM	Growth monitoring
GNI	Gross national income
GSK	GlaxoSmithKline
HCP	Health communication partnership Zambia (USAID)
HepB	Hepatitis B
Hib	*Haemophilus Influenzae* type B
HIV	Human immunodeficiency virus
HPV	Human papilloma virus
HRH	Human resources for health
HSS	Health systems strengthening
HSSP	Health Services and Systems Program
ICHE	Integrated child health event
IEC	Information, education and communication
IMCI	Integrated management of childhood illnesses

ITN	Insecticide-treated net
JICA	Japan International Cooperation Agency
JRF	WHO/UNICEF joint reporting form
LMICs	Low- and middle-income countries
LSHTM	London School of Hygiene and Tropical Medicine
MCDMCH	Ministry of Community Development for Mother and Child Health
MCH	Maternal child health
MCV	Measles containing vaccine
MDG	Millennium Development Goal
MI	Micronutrient Initiative (CIDA)
MOH	Ministry of Health
MOST	Micronutrient opportunity for science and technology (USAID)
MTEF	Mid-term Expenditure Framework Planning
NFNC	National Food and Nutrition Commission
NGO	Non-governmental organization
NIDs	National immunization days
NVivo	Qualitative data analysis computer software
ODA	Official development assistance
OLS	Ordinary least squares regression
OPV	Oral polio vaccine
PDR	People's Democratic Republic (Laos)
Penta	Pentavalent vaccine (protects against: diphtheria-tetanus-pertussis (DTP), hepatitis B, Haemophilius influenza type b)
PHC	Primary health care
PI	Principal investigator
PS	Permanent Secretary
SD	Standard Deviation
SIA	Supplementary immunization activity
SIDA	Swedish Intentional Development Agency
SNID	Sub-national immunization day
Soc-mob	Social mobilization
Stata	Statistical software package used for data management, statistical analysis, graphics, simulations, regression analysis
TDRC	Tropical Disease Research Centre (Zambia)
THE	Total health expenditure
TT	Tetanus-toxoid
TV	Television
UCI	Universal Child Immunization unit (at Ministry of Health)
UN	United Nations
UNICEF	United Nations Children's Fund

UNZAREC	University of Zambia Biomedical Research Ethics Committee
USAID	United States Agency for International Development
VA	Vitamin A
VAD	Vitamin A deficiency
VAS	Vitamin A supplementation
WASH	Water, sanitation and hygiene
WCAR	West Central Africa Region
WHO	World Health Organization
WUENIC	WHO and UNICEF estimates of national immunization coverage
ZISSP	Zambia Integrated Systems Strengthening Programme
ZMW	Zambian Kwacha

Chapter 1: Introduction, background (literature review) and objectives

1.1 Introduction

In seeking to accelerate the reduction of child mortality in low- and middle-income countries (LMICs), a mass delivery of cost-effective child survival interventions through integrated child health events (ICHEs) have been recognized as a viable strategy and have been implemented in many settings.[1-3] At service delivery level, integration of health service delivery can manifest in different ways.[4] This study focused on co-delivery of a range of services delivered for a catchment population at one location and under one overall service provider, such as those conducted in multi-purpose outreach visits.[4] A feature of this combined delivery modality from the community's perspective, is the opportunity to receive coordinated care, rather than having separate visits for separate interventions[4]. Multi-component and integrated events are seen to be promising in ensuring that multiple health needs are addressed, building on commonalities in care delivery and drug distribution systems, enabling the sharing of facilities, and aligning funding sources.[5]

Integrated child health events (ICHEs)—a terminology developed for this study— can be broadly defined as any campaign-style events that deliver two or more maternal and/or child health and nutrition services at any given time during the year, taking place in low-to-middle resourced environments with limited health infrastructure. These campaigns are manifested in various forms and are referred to by different names (Table 1).

It was important to introduce the overarching the ICHE term for the integrated child health service delivery approaches encompassing a wide variety of campaigns. Creating the ICHE terminology enabled the exploration of these interventions from a broader perspective, in contrast to examining Child Health Days (CHDs) or immunization campaigns separately, as there are many commonalities and overlaps as well as differences between these. Having a common terminology for these integrated campaigns enabled a comprehensive analysis and obtained an overall

Table 1 Different manifestations of integrated child health events

Name	Countries
CHILD HEALTH DAYS	
Child Days Plus	Uganda
Child Health Days	Botswana, Ethiopia, Ghana, Guinea-Bissau, Liberia, Mali, Mauritania, Senegal, Sierra Leone, Somalia, Swaziland, Togo
Child Health Week	Mozambique, Zambia
Child Survival Campaign	Central Africa Republic, Chad, Democratic Republic of Congo, Guinea, Senegal
Maternal & Child Health Week	Sierra Leone
Maternal and Neonatal Child Health Week	Nigeria
Mother & Child (Health) Week	Burundi, Madagascar, Pakistan, Rwanda
National Child Health & Nutrition Week	Eritrea
National Health Days	Angola
National Micronutrient Days	Burkina Faso, Niger
National Vitamin A Supplementation & Deworming Days	Congo, Democratic Republic of Congo, India, Myanmar, Nepal, Togo
Sustained Outreach Services	Indonesia
DISEASE-PREVENTION PRIORITY CAMPAIGNS	
Immunization Week/Campaigns	Afghanistan, Papua New Guinea
Measles / polio Supplementary Immunization activities (SIAs)	Over 28 countries in LMICs (2014). Afghanistan, Democratic Republic of Congo, Haiti, Kenya, Republic of Congo, Zambia, etc.
National Immunization Days	Angola, Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Cote d'Ivoire, the Democratic Republic of the Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea Bissau, Mauritania, Niger, Nigeria, the Republic of the Congo, Senegal

picture of how these types of events function. A more specific definition of ICHE is provided in section 1.2.3.

"Integrated child health events" have only been mentioned briefly in three sources: UNICEF mentioned integrated child health events that occur bi-annually to deliver VAS in one of their child survival and development-related publications[6], though they have reverted to calling these events as "Child Health Days."[1,7]; DFID referred to integrated child health events once in a publication[8] to describe the activities that UNICEF supported as a multi-lateral agency; and a UN document mentioned integrated child health events once when they described immunization events that

deliver additional services "such as in polio NIDs."[9] Studies that mention integrated delivery approaches tend to refer to it as "integration of targeted health interventions", "integration of health service delivery"[10] or "integrated delivery of health services."[10,11] This demonstrates that they were not used as a distinct concept.

Though the terminology seeks to encompass an extensive range of campaigns, some types of campaigns (such as malaria, HIV, schistosomiasis and other disease-prevention campaigns) were not considered in this study due to the lack of data within the dataset used for this analysis. The analysis did not alter any VA coverage indicators or add any additional measles SIA coverage data points into the CHD dataset, as VA and immunisation data points in the CHD database are closely scrutinised by UNICEF to assure quality.[12]

ICHE intervention packages usually include distribution of two or more key health and nutrition interventions, such as childhood immunization, vitamin A supplementation (VAS), deworming, insecticide-treated nets (ITNs) and growth monitoring (GM) to provide selected services to the target population in a short time. There are two main categories of ICHEs: 1) Child Health Days (CHDs) and 2) disease-prevention immunization-focused campaigns, such as measles supplementary immunization activities (SIAs) and polio national immunization days (NIDs). Current trends show a rise in the number of interventions delivered through these campaigns,[1,13] with at least 73 countries having held ICHEs between 2005–2010 and the number of interventions delivered reaching up to 11 in some countries.[14]

Despite the increasing magnitude and number of interventions delivered through ICHEs, there is little evidence on whether providing a large number (more than five) and different types of intervention packages, have any association to the coverage outcomes of specific interventions. A related question is what are the institutional and contextual factors necessary for obtaining high coverage in countries that deliver a high number of interventions in successive years? Finally, questions and debates persist regarding the potential of ICHEs to undermine, rather than support, routine

immunization within the broader health system. The overall aim of this study is to examine whether delivering multiple interventions through campaign-style events is an effective strategy, given the global trend towards expanding this popular delivery strategy, and in the context of long-term strengthening and sustaining of routine immunization system issues found in LMICs.

1.2 Background (Literature Review)

The following literature review is structured thematically, according to the conceptual framework introduced in Chapter 2.

1.2.1 Child mortality in sub-Saharan Africa

Substantial progress has been made in reducing under-five mortality rates (U5MRs) in low- and middle-income countries (LMICs), with these rates declining by more than half from 90 to 43 deaths per 1,000 live births between 1990 and 2015.[15] Though the annual rate of decline of U5MR in sub-Saharan Africa was over five times faster during 2005–2013 than it was during 1990–1995,[15] it is still the region with the highest number of the world's under-five deaths (3 million in 2015).[15] It has been demonstrated that childhood mortality in LMICs could decrease even more substantially if effective, low-cost interventions reached mothers and children who need them most.[16-19] At least two-thirds of all childhood deaths are preventable, and cost-effective measures that could prevent or dramatically reduce child mortality are well established.[19,20] There is global recognition that urgent action must be taken to speed up progress beyond 2015.[*15,21] The current unacceptable number of childhood deaths requires scaling up child health interventions that have proven affordable and effective across many settings.

1.2.2 Child health intervention delivery strategies

The reality in many LMICs is that health systems remain weak and unable to respond to the immediate challenges of persistently high levels of child mortality.[1,22,23] Thus,

[*] Sustainable Development Goal 3, target 3.2 calls to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-five mortality to at least as low as 25 per 1,000 live births by 2030.

there have been numerous attempts to deliver child health interventions through different delivery models. One strategy is the *horizontal* or *comprehensive primary health care* delivery approach,[24] where services are typically delivered through publicly-financed health facilities. These facilities provide basic health services on a routine basis,[25] and conduct outreach services where health care providers bring services closer to users by visiting their communities on a more frequent basis, identifying children who have missed their vaccinations and other services.[26-28] Other mechanisms to deliver child health interventions include an enhanced role of frontline community health workers,[29-33] legislative mechanisms promoting coverage, mass media information campaigns[28] and delivery through the private sector.[34,35]

The other primary strategy, often referred to as a *vertical* or *selective disease-control* approach and common in LMICs, implies a delivery of specific interventions, typically including a package of selected interventions delivered through immunization or intervention-specific campaigns and expanded outreach programmes, and targeted to the needs of particular user groups.[36-39] In countries where access to health services is problematic and the health system is weak, a nationwide campaign outreach approach has proved to be an essential health service delivery strategy to reach as many children as possible in a relatively short period of time.[1,26,28,40-42] In practice, however, a combination of both targeted delivery and comprehensive health system strengthening approaches is frequently used.[10,25,38,43]

The success of the vertical delivery mode was made apparent with the global eradication of smallpox in 1979[44-48] and in rapidly preventing millions of childhood deaths through the Expanded Programme on Immunization (EPI),[49-52] which stressed the expansion of campaign delivery approaches in the 1980s and 1990s.[53] The Global Polio Eradication Initiative, which began in 1988, has since achieved a 99% decrease in the number of polio cases worldwide.[54,55] The drive to achieve the Millennium Development Goals (MDGs) launched in 2000, notably of MDG 4 to reduce under-five mortality by two-thirds between 1990 and 2015, motivated a move to accelerate

scale up of delivery of evidence-based, cost-effective child survival interventions at a national level.[56-58]

Vitamin A deficiency (VAD) became known as a major contributor to the mortality of children under-five in the early 1990s,[59] and evidence has shown that improving the vitamin A status of deficient children through supplementation increases their resistance to disease and can reduce mortality from all causes by approximately 23%.[60] VAD is estimated to affect approximately one-third of children under the age of five around the world,[61] and it is estimated to claim the lives of 670,000 children under five annually.[62] In settings where VAD is a major public health problem, vitamin A supplementation (VAS) is recommended by WHO in infants and children 6–59 months of age as a public health intervention to reduce child morbidity and mortality.[63] VAS are usually given in capsule form: one capsule of 100,000 international units (IU) for children aged 6-11 months, and 200,000 IU for children aged 12-59 months old.

Measles has also caused an estimated 2.6 million deaths each year before widespread vaccination in 1980.[64] During 2000-2014, measles vaccination prevented an estimated 17.1 million deaths, and global measles deaths have decreased by 79% from 2000 (estimated 546,800 deaths) to 2014 (est. 114,900).[64] While significant progress has been made so far, yet in 2014, measles caused an estimated 115,000 deaths of children mostly under 5 years of age.[65] Measles can be completely prevented with two doses of the measles vaccine. Measles vaccination and VAS are still considered key strategies for contributing to the attainment of the Sustainable Development Goal (SDG) target 3.2 for reduction in under-five mortality.

The co-delivery of essential child health interventions has been crucial in meeting the MDGs goals in some settings.[53] During this time, the strategy to deliver vitamin A (VA) supplementation with polio NIDs also began.[66] The co-delivery approach was well publicized and motivated many countries to provide VA at the same time as oral polio vaccine (OPV) to children under the age of 5 via these campaigns.[26,67-73] The

MDG Health Alliance noted that the lifesaving potential of the co-delivery of life-saving interventions – identified as VA, oral rehydration salt, zinc and rotavirus vaccine – through integrated immunization campaigns can be maximized when the regions with the largest concentrations of children unreached by routine health systems are prioritized.[54]

1.2.3 Integrated child health events (ICHEs)

Expanding access to cost-effective child survival interventions through ICHEs has evolved in recent decades to accelerate the reduction of child mortality in LMICs,[1,42,74-78] offering the promise of achieving a clear impact within a short period of time. There has been a dramatic increase in the reliance on ICHEs as an effective delivery strategy for key child health and nutrition interventions, with 73 countries carrying out ICHEs in 2005–2010.[14] Many LMICs have been using targeted delivery of interventions as a vehicle to provide other health services on a periodic basis, mainly to take advantage of available resources and work in conjunction with existing delivery mechanisms.[53,69,73,74,79,80] Immunization coverage was increasing in sub-Saharan Africa in the early 2000s, making it attractive to add more key interventions that would benefit from improved coverage.[53] In addition to routine immunization activities, immunization campaigns conducted as part of accelerated elimination and eradication programmes of vaccine-preventable diseases offered opportunities to reach a significant proportion of the population.[81] Currently, ICHEs of various types are being conducted in many LMICs countries, often under different names.[3,22,82-84] Table 1 presents the different variants of ICHEs used, mainly in Africa but also in other regions. Although ICHEs target a wide range of the population across various settings, this study focuses specifically on the delivery of child health and nutrition services. The co-delivery of multiple interventions in a single campaign is now common practice in Africa and elsewhere, and evaluations from Ghana,[85] Madagascar,[75] Niger,[79] Tanzania,[86] Togo[87,88] and numerous other studies[53,69,73,85,89] have provided evidence of increased coverage of a given intervention when co-delivered with other interventions.

Despite the apparent popularity of ICHEs in many LMICs, there has not yet been an in-depth, historical analysis of the evolution of a country's ICHE strategy with a focus on the implications of additions and removals of interventions delivered through campaigns. Why do countries adopt this multi-faceted strategy? What are the conducive factors for the successful expansion of ICHE? What are the contextual characteristics that may lead a country to scale the strategy back?

In this study, any campaign-style events that deliver two or more maternal and child health and nutrition services at any given time during the year are termed *integrated child health events* (ICHEs). This terminology was developed explicitly for this study. There are two main categories of ICHEs which are examined in this study: 1) *Child Health Days (CHDs)* (which include Child Health Weeks) and 2) *disease-prevention immunization-focused campaigns*, such as measles SIAs and polio NIDs. There are numerous other types of disease-prevention campaigns focusing on different diseases other than measles and polio, such as typhoid, human papilloma virus (HPV),[90,91] cholera[92] and insecticide-treated net distribution for malaria,[75,86,88,93-96] but these are not included in this study.

Child Health Days (CHDs) are 'regular events, conducted every 6 months, organized to deliver two or more health or nutrition services to infants, children under the age of five, and, in some cases, pregnant or lactating women'.[1] In many countries, CHDs deliver VA capsules, which are usually given twice a year, 6 months apart, to children aged 6 months to 5 years of age.[†] CHDs evolved as a key strategy to accelerate the delivery of essential interventions for child survival[19] aimed to reduce U5MRs.[1,26,78,97] While polio NIDs began to phase out in early 2000 as multiple countries and regions began to be certified as polio-free,[‡98] VA delivery efforts continued with the delivery

[†] Vitamin A supplementation comes in two different doses depending on the age of the child. 100,000 IU are given to infants aged 6–11 months (once), while 200,000 IU are given to children aged 1 to 5 years (every four to six months) (WHO, Guideline: Vitamin A supplementation in infants and children 6-59 months of age, 2011.)

[‡] Polio-focused national immunization campaigns are still being conducted in countries and surrounding regions where outbreaks occur.

of other health and nutrition interventions, especially deworming tablets[79,99] and various antigens, depending on the country context. The idea of essential child health and nutrition packages gained widespread traction among donors, UN agencies and many countries during this time.[100,101]

Disease-prevention priority campaigns are campaigns focused on specific disease eradication efforts, which are not limited to six-monthly schedules (as in CHDs). Instead their frequency is based on disease control priorities and in response to disease outbreaks.[102] The two immunization-focused campaigns included in the quantitative analysis of this study are measles SIAs and polio NIDs.

a) *Measles supplementary immunization activities (SIAs)* target all children in a defined age group with the objectives of reaching never-vaccinated children who have never had measles as well as providing a second dose for cases of primary vaccine failure[103,104] through fixed, outreach, and door-to-door services via an expanded network of vaccination posts.[74,76] All children in the target age group and geographic area are eligible to receive a dose of measles vaccine irrespective of past immunization or of clinical measles. A second dose of measles vaccine, available through supplemental immunization, reduces the proportion of susceptible children in a given population rapidly and prevents measles outbreaks. (Appendix 10 for types of measles SIAs.) The first dose of measles vaccine should be given to children at the age of 9 months or shortly thereafter through routine immunization services. A 'second opportunity' is provided to all children, to reach those who failed to receive the first dose or failed to develop immunity following the first vaccination. This dose is given through routine immunization services or through measles SIAs. It is now relatively common to deliver additional child health interventions along with the measles vaccine through SIAs.[2,105] In 2011–2012, out of 35 measles SIAs conducted in the African region alone, 23 (66%) had one other child health or nutrition intervention delivered.[106]

b) *Polio national immunization days (NIDs)* are mass immunization campaigns conducted in two rounds, approximately one month apart, with the aim to interrupt circulation of poliovirus by immunizing every child under 5 years of age with two doses of oral polio vaccine, regardless of previous immunization status.[107] Polio NIDs are conducted in two rounds, one month apart. A drop of oral polio vaccine can be given by community volunteers with minimal training, as it does not require needles and syringes to provide the vaccine. The idea is to cover children who are either not immunized against poliomyelitis, or are only partially protected, and to boost immunity in those who have been immunized.

1.2.4 Advantages and constraints of integrated child health events

The debates around the advantages and limitations of the various types of ICHEs have been well documented.[37,38,58,108] The advantages of ICHEs is that they can increase the coverage of certain child health interventions,[41,42] achieve rapid, equitable coverage at low cost, raise government ownership, and strengthen collaboration at the national level.[109] There are indications that co-delivery of child health services through campaigns leads to improvement in access to services and contributing to intervention coverage increase. A study evaluating measles SIA that delivered additional interventions showed improvement in access and efficiency,[110] reducing disease outbreaks,[98,103] contributing to improved measles immunization coverage and providing an opportunity for a second dose.[41] A study of CHDs in Eastern-South Africa reported that special events like CHDs are particularly useful in areas with the weakest health infrastructures – for example, by bringing services to remote areas underserved by primary health care.[42,111,112] Other studies have also shown the positive impact of co-delivering interventions on coverage in low income settings[19,57,113] and a similarly beneficial impact through outreach or scheduled events.[20,67,68,72,78,114]

Another positive aspect of the co-delivery of multiple interventions is its cost-effectiveness.[76,88,115] A growing body of evidence has shown that the delivery of child health and nutrition interventions through immunization delivery channels has helped to achieve rapid, high and equitable coverage[110,116-120] at relatively affordable

cost.[84,85,88,93,94,121-126] The unit cost of providing the services to each child with basic interventions in Ethiopia through CHD was as little as US$0.60.[124] A study analysing the cost-effectiveness of Zambia's Child Health Week (CHWk) showed that the cost per child was US$0.46 when measles, VA and deworming were distributed during the campaign. The total CHWk costs were estimated to be US$5.7 million per round, with measles accounting for 57% of the total costs, deworming 22% and VA 21%.[121] The additional supplies and personnel required to include measles increased total costs by 42%, but reduced the average costs of providing VA and deworming alone. Reliance on volunteers to provide 60% of CHWk manpower enabled expanded coverage while shortening the duration of CHWk and reducing costs by one-third.[121] With costs of US$1,093 per life saved and US$45 per disability-adjusted life-year saved, WHO's cost-effective classification criteria classify Zambia's CHWk as 'very cost-effective'.[127]

Analyses of integration of delivery of services for measles and malaria control in Africa shows that mass distribution of ITNs through vaccination campaigns achieved rapid, high and equitable coverage, at reasonably low cost.[75,86,93] The operational cost per ITN delivered was US$0.35 in rural areas in comparison to US$1.89 in urban areas with a voucher-based distribution system.[93] The results are comparable to other efforts in sub-Saharan Africa that have linked ITN distribution, VAS and deworming to campaign-style immunization programmes.[67,69-71,73,85,114,128-130] These findings and systematic literature reviews on the subject[74] have led to the ranking of the co-delivery of interventions through these events as 'pro-poor',[131] i.e., increases in coverage were significantly greater in the poorest 20% of households than in the wealthiest 20%. The potential benefits of this approach have prompted global policy changes to encourage increased integration of ITN delivery and vaccination.[80,132] Anecdotal evidence from studies suggests that ICHEs were often country-driven and involved stronger collaboration between national-level partners.[41,42,133] Funding for ICHEs is usually jointly provided by governments and development partners.[41,42,72,112] Further analysis of this phenomenon, notably in the case of Zambia, is explored in Paper 3 of this study (Chapter 5).

However, there are questions about the sustainability of health service delivery strategies such as ICHEs, which are largely reliant on in-kind, financial and/or technical donor support.[124] In the case of Ethiopia, 63% of the funding of the entire CHD campaigns was provided by UNICEF.[124] Another frequently expressed concern in conducting ICHEs is the potential to disrupt routine health service delivery, and particularly routine immunization. Common impediments noted in studies include the diversion of health care workers from their usual PHC-related tasks, payment of incentives, and focusing only on the delivery of selected interventions,[42] as well as duplication in the capturing and use of health information.[42] Some studies show that the occurrence of SIAs is associated with a decrease in routine immunization coverage at the district level, negatively affecting routine services by disrupting their regular functioning and diverting resources from other routine health activities.[134] There are also concerns around overburdening health staff by adding more tasks than existing numbers of staff can handle given the available resources,[42,76,111,112,124] and about shortages of human resources, particularly in rural areas, resulting in increased workload during the events.[53,58,104,105,118] Finally, delivering multiple interventions through ICHEs is thought to be a challenge when it comes to planning a large number of services for a wide range of target groups.

Despite the concerns regarding ICHEs, there has nonetheless been a trend towards increased numbers of interventions delivered through these events.[1,54,106] As the number of interventions per event increased over time, understanding how the breadth of the interventions package is associated with coverage outcomes is a priority research question. Existing studies do not explore the effect of delivering multiple interventions during these campaigns on coverage, or the effect on delivery of different combinations of interventions. For example, in analysing the contribution of CHDs to improving coverage of periodic interventions, Oliphant et al. analysed coverage trends of interventions (measles immunization, vitamin A supplementation, de-worming, and insecticide-treated nets) delivered during CHDs in six African countries. However, this study did not take into account the number of

interventions that were simultaneously delivered and the effect on coverage; nor did they look at the association of the combination of interventions delivered and its outcomes.[135] Other studies on CHDs, such as the study by Fielder[40], address the costs of CHDs and make a strong case for a campaign-mode of delivery being more cost-effective when delivering multiple interventions, namely vitamin A along with deworming and measles vaccines. However, many of these studies have not examined the conditions that led to the increasingly multifaceted nature of ICHEs, the enabling factors influencing performance, or the reasons why some countries may consider moving away from campaigns as a primary child health service delivery model in underserved areas.

Thus, further research is required to assess whether co-delivering multiple interventions through campaign-style events is an effective strategy, what the conducive factors are for the successful expansion of ICHEs, and what the implications are of a reliance on ICHEs and then abruptly moving away from the campaign strategy. The original contribution of this study is that it takes a new approach by analysing multiple types of campaigns, calculating the number of interventions delivered through these campaigns, and analysing the association with coverage outcomes. It also conducts a historical analysis of the evolution of a country's ICHE strategy, involving either adding or removing interventions, and the enabling factors of performance, as well as the reasons why some countries may consider moving away from campaigns as a primary child health service delivery model in underserved areas.

1.3 Rationale and justification

The effectiveness of interventions to increase child survival under managed conditions is well established,[19,113] but much less is known about *how* to deliver multiple intervention packages at scale in poor country contexts. To bridge the gap between knowledge of effective interventions and strategies on how to deliver those interventions to communities who need them most, it is essential to focus on health system research concerned with implementation.[136-138] A study assessing priorities

in health research funding found that the reduction of child mortality by developing new technologies was only one-third of what could be achieved if existing technologies were successfully delivered and fully utilized.[139] Similarly, a key recommendation of the *Countdown to 2015* report was to 'invest in implementation research to identify effective strategies to deliver proven interventions'.[20]

While ICHEs have become standard practice in recent years and remain widely used in many LMICs, there is little evidence on whether delivering multiple interventions or different types of intervention packages has any association with the coverage levels of specific interventions. Related questions include: What are the enabling factors for obtaining high coverage levels in countries that deliver multiple interventions? How did a country with a relatively weak health system, such as Zambia, succeed in delivering multiple interventions effectively and how did it overcome contextual constraints? How are ICHEs designed, managed, and implemented in a country (Zambia) that increasingly adds extra interventions while retaining successful coverage outcomes? What are the main factors that led Zambia to rely on CHWk to deliver multiple interventions and then abruptly move away from the expanded CHWk health service delivery strategy to only deliver two interventions post-2013?

This study intends to bridge gaps in understanding the issues in delivering multiple interventions by examining the models and strategies used in the implementation of ICHE. The study involves a quantitative analysis of a unique global data set, seeking to discover whether the number and type of interventions delivered through ICHEs show any association with coverage outcomes. A qualitative country case study undertaken in Zambia seeks to provide an in-depth analysis of the implementation factors that led to establishing a successful and well-received Child Health Week (CHWk), a type of ICHE, which achieves high coverage while delivering high numbers of interventions. The study takes an evolutionary perspective, recognising that vertical programmes, routine health systems and the contexts within which they function, are dynamically changing, demonstrated by Zambia's initial enthusiasm for

multi-component strategies and later, a strategic move away from predominantly campaign-based delivery in an effort to strengthen the countries' routine immunization system.

1.4 Aim

This study aims to examine whether delivering multiple interventions through campaign-style events is an effective strategy in LMICs, given the drive towards expansion of this delivery strategy, and the need to sustain and strengthen routine immunization systems in the long-term.

1.5 Objectives

1. To examine the association between the number and different packages of interventions delivered through ICHEs and the coverage of interventions.
2. To identify the key contextual socioeconomic and policy development factors which affected Zambia between 1999-2014 and led to the decision to expand the ICHE strategy.
3. To identify the key factors that helped to facilitate the expansion of CHWk and the reliance on it as a primary service delivery strategy for improving child health.
4. To explore the rationale behind the reliance on the CHWk strategy in Zambia and the subsequent abrupt move away from that campaign strategy after 2013.

1.6 Research questions

1. Does delivering high numbers and different packages of interventions through ICHEs have any association with coverage outcomes? (Paper 1)
2. What contextual factors affected Zambia between the years 1999-2014 that led them to expand their ICHE strategy by adding on interventions? (Paper 2)
3. What are the factors that influenced performance and the challenges encountered when delivering larger numbers of interventions within CHWk events from 2001-2015 in Zambia? (Paper 3)

4. What are the key factors that led Zambia to start relying on CHWk to deliver multiple essential child health services, and the reasons to abruptly move away from this strategy of delivering multiple interventions through CHWk from post 2013? (Paper 4)

1.7 Thesis structure

The thesis starts with the introduction and literature review (Chapter 1), followed by an explanation of the conceptual framework and methodology (Chapter 2). The findings are organized in four research papers, corresponding to the research objectives. The thesis is presented in a research paper-style, consistent with the LSHTM recommended formats for a doctorate in public health (DrPH) thesis. Each of the four findings chapters is written-up as a stand-alone paper with its own background, methodology and findings. This style inevitably involves some repetition; although each paper pertains to a separate objective, it is located within a coherent narrative (a thesis) with an overarching aim, conceptual framework and methods. A similar contextual and methodological framework in each paper is therefore necessary and appropriate.

Paper 1 (Chapter 3) of the study involved a quantitative analysis of a global dataset, seeking to discover whether the number and type of interventions delivered through ICHEs demonstrated any association with coverage of specific interventions. Secondary data analysis was conducted using UNICEF's global monitoring database of CHDs which also included measles SIAs and polio NIDs conducted between 1999–2010.[83] A descriptive statistical analysis of the global situation of ICHEs was conducted, and the association between the number of interventions delivered and VA and measles coverage, and the association between the different packages of interventions with VA coverage, were analysed.

Paper 2 (Chapter 4) focused on analysing the evolution of the CHWk in Zambia in 1999–2014, including the addition of different interventions, taking into

consideration its level of socioeconomic conditions and policy development environment.

Paper 3 (Chapter 5) explored key factors enabling the co-delivery of multiple interventions through CHWk in Zambia, along with institutional processes and emerging challenges. It assessed these issues from a historical perspective, exploring the evolving implementation approaches that led to adjusted designs of CHWk.

Paper 4 (Chapter 6) sought to identity key explanations that led Zambia to rely on delivering multiple interventions and then abruptly move away from the CHWk strategy. The implications and dilemmas related to sustaining delivery of essential interventions, while further sustaining and strengthening the routine immunization system, were considered.

The discussion and conclusions (Chapter 7) provides further interpretation of the findings and their implications. The emerging story of the development of the CHWk in Zambia is discussed, placing it in the context of the country's socio-economic situation and health service delivery initiatives. Recommendations for policy and further research are identified.

Chapter 2: Conceptual framework and methodology

2.1 Conceptual framework

This study focuses primarily on the implementation aspects of delivering multiple interventions through a wide-scale campaign-mode of health service delivery. Werner's implementation research guideline[140] was used to elaborate a modified ICHE implementation research framework to underpin this analysis. Implementation research addresses the *how* of translating research knowledge into practice within the health system, and explore the challenges that are faced when applying this in the real world.[136,137,141]

Several frameworks have been initially considered, such as Atun and colleagues' 'framework of integration of targeted health interventions into health systems'[142] and WHO's 'building blocks' health systems strengthening framework,[143] as both frameworks were related to health system functions. However, they were found to be less applicable in answering the research questions in this study. Atun and team's framework[142] is a conceptual tool that can be used to analyse the 'integration' of health interventions and to explore how vertical health interventions are integrated in relation to health system functions, and how these are adopted (which they call 'adoption system') and diffused by individuals and organizational agents. WHO's health system framework[143] identifies major system inputs needed to implement policies or interventions, but does not facilitate the analysis of how these can be implemented, especially where interventions are multiple or complex (such as during a campaign).

Neither of these frameworks are intended to be used to analyse the actual implementation of a strategy or the evolutionary aspects of how a strategy develops over the years analysed in this study, which is one of the objectives of this study. The action-research framework was[144] also not applicable for this study, as this analysis does not require active, moment-to-moment theorising and inquiries into occurrences in the midst of an ongoing programme, nor does it focus on the effects

of the researcher's participatory actions to improve the performance quality of a strategy.

The implementation framework by Werner,[140] which was originally composed of six major components (programme design, resources, context, administration, services and outcome) was modified after the initial stage of data collection was completed. Human and financial resources became separate categories rather than just 'resources', recognising their significance and distinct impact on ICHEs. Programme design was changed to strategy design, as ICHE was a plan of action and policy aimed to deliver child health services; administration was changed to management and monitoring; and communication, constraints, supply and logistics were added, as these components emerged as being distinct from each other, each requiring elaborate analysis to understand the complexities of strategy development and implementation of ICHEs. The 'context' was originally removed from this ICHE framework, as it was to be described in the overall contextual background of the study; however, the contextual factors were revealed to be one of the most significant components in the expansion and minimizing of ICHEs in Zambia, and thus, the context was added as a separate component (Figure 1). Figure 2 demonstrates the key areas covered by each dimension. This implementation framework incorporated a temporal aspect that enabled the consideration of several successive strategy designs from previous years, whereby previous ICHE strategies fed back into the redesigning of the strategy for the next round, based on the constraints and contextual factors present during each event cycle of ICHEs.

The primary purpose of the adapted ICHE conceptual framework was to provide a broad frame to support the collection and structuring of a large amount of data, as well as a starting point for the analysis. The data obtained from the interviews and literature review, which stemmed from questions linked to different components of the framework, were further coded using NVivo. As the analysis progressed, more detailed codes and groupings of ideas and issues emerged, and were then organised into hierachies as their meaning was elicited.

The ICHE conceptual framework was created to analyse integrated child health events (ICHEs), consisting of 11 components, where each component addressed an aspect related to the design and implementation of the different ICHE strategies (Figure 1): strategy design, management and monitoring, human resources, financial resources, communication, service delivery, supply, logistics, outcomes, constraints and the context. The 'strategy design' dealt with the content of the ICHE strategy. Aspects analysed were planning, conceptualization, decision-making, the reasons behind why interventions were added on or dropped throughout each campaign, and strategizing of the different modes of ICHEs in the Zambia case. 'Management and monitoring' dealt with coordinating bodies and partnerships, management of health activities, district health management, and monitoring, supervision and reporting of ICHEs. 'Human resources' looked at issues of incentives, training, workload of health workers, as well as health worker staffing at the district and health facility levels. 'Financial resources' focused on sources of funding, national-district financial flow, and district funding for health activities. 'Communication' included issues on targeting messages, sensitizing and social mobilization regarding the multiple interventions delivered through ICHEs. 'Service delivery' dealt with the different types and number of interventions delivered through ICHEs. The delivery and management of supply and logistical aspects supporting health workers to deliver multiple interventions through ICHEs and to access health services by caregivers and children were also assessed. For 'Outcomes', in addition to the coverage of vitamin A supplementation (VAS) and measles vaccine, the implications of ICHEs on the delivery of routine immunization services were also analysed. Outcomes also included perceptions and reactions of key stakeholders to ICHEs at each stage of development. The contextual factors that influenced the evolution of the strategy were also considered, including the political situation of the Ministry of Health (MOH), partnership models in the implementation of ICHEs, and characteristics of the national health agenda.

It is important to emphasise that the conceptualising of the framework into separate components does not aim to be reductionist and imply that these are distinct in their

influence on service delivery. The distinction is mainly for analytical purposes, to ensure that areas identified as important in previous studies are covered, as well as to guide the development of tools and analytical strategy. The framework has been used in a flexible manner and was continually refined as new ideas emerged during study design, field work and initial analysis. As shown later in the thesis, the analysis was inductive, allowing for the emergence of new themes and dimensions, while reflecting on some of the key framework dimensions.

The framework components were very broad in nature, and many of the themes were derived from more detailed codes. Each dimension had a different number of codes. For example, in Paper 4, (Sec 6.5.6, p. 142) the sub-heading of the theme of "Supplementing health workers for Child Health Weeks" encompassed human resources, financial resources, logistics and service delivery components. Though the ICHE conceptual framework was instrumental in collecting and structuring large amount of data, the subsequent coding and identifying of key themes required considerable granularity.

Therefore, using the components as sub-headings for the key findings would not have been sufficient to answer the research questions, as the data would be skewed under some components. Thus, the findings in Papers 2, 3 and 4 are presented by major themes rather than strictly following the conceptual framework components. In summary, the framework provided a starting point, but the emerging themes provided a richer picture of the issues studied in a way that superseded the framework in terms of presenting the findings.

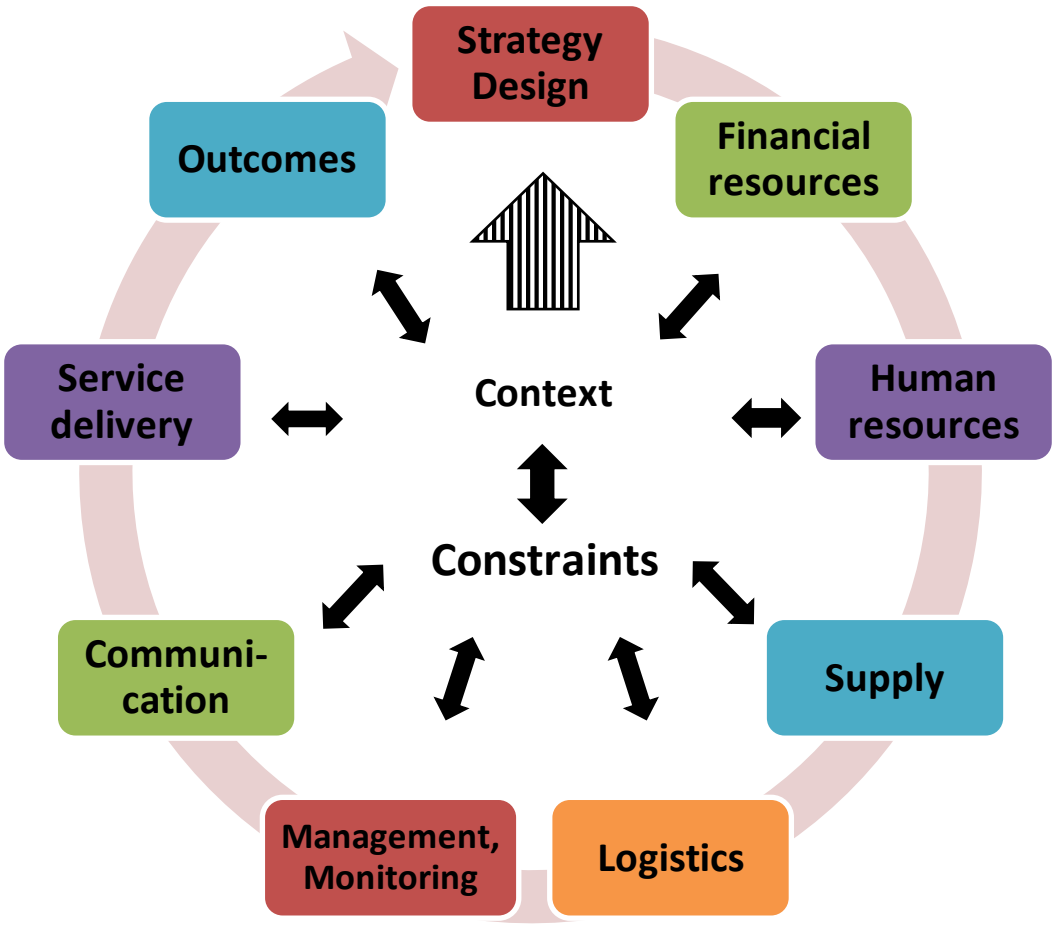

Figure 1 Conceptual framework: implementation research framework, adapted

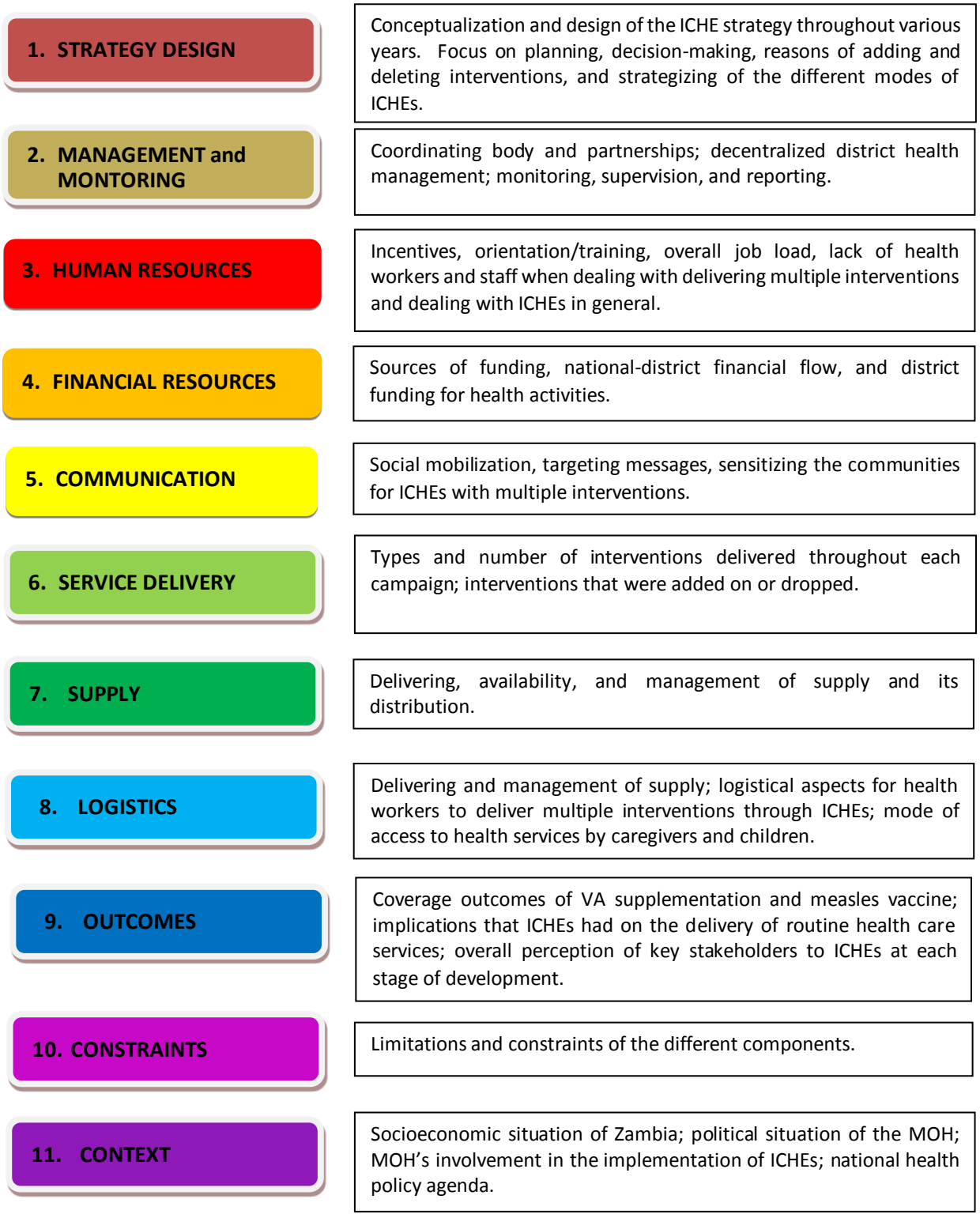

Figure 2 Re-developed implementation research framework components

2.2 Methodology

2.2.1 Quantitative analysis: Description of data set

Original UNICEF CHD database. A global database of Child Health Days (CHDs)[83] was obtained from UNICEF Health and Nutrition sections at New York headquarters in 2010, and an updated version was received in 2013[145] which was used in this analysis. Permission to use the CHD database for this analysis was obtained from the UNICEF Health and Nutrition sections. The original database contained information of various ICHEs of 83 countries from 1999–2010.

Data in the CHD database were compiled from UNICEF's vitamin A (VA) database and the WHO/UNICEF Joint Reporting Form (JRF) immunization database. The key data source of the JRF database is a combination of administrative data based on reports from service providers and household surveys.[146§] UNICEF has collected VAS (vitamin A supplementation) coverage data annually since 1999, and from 2005 has captured information of different types of health service delivery mechanisms, and coded them as CHDs, supplementary immunization activities (SIAs), polio national immunization days (NIDs), or 'ongoing routine'. Data on co-delivered interventions in the database were: VAS, immunization, 'different antigens' (i.e., measles, polio, tetanus toxoid), deworming, distribution or retreatment of insecticide-treated nets (ITNs); growth monitoring (GM), water, sanitation and hygiene (WASH), behaviour change communication (BCC) and 'other services'. 'Other services' such as family planning and HIV-prevention as well as BCC messages were noted in some events (Appendix 1). Some SIAs and NIDs were also coded as CHDs if an event was held approximately six months immediately prior to or immediately following another similar child health event. SIA or NID events that did not meet the six-monthly schedule were not coded as a CHD event but as measles SIA or polio NID[1] (Appendix 2). Palmer and team have conducted an analysis of the global situation of CHD in

§ The estimates of immunization coverage are based on government reports submitted to WHO and UNICEF and are supplemented by survey results from published and grey literature. The final estimates are technically assessed by WHO and UNICEF of the performance of national immunization systems (Burton, 2009. See Reference 133).

another paper[1] where they analysed CHDs – events which were not coded as CHD were not included in their analysis (Appendix 3).

The CHD database is maintained and updated by the UNICEF Nutrition section. Annual review processes with UNICEF country offices' focal points take place for vitamin A (VA) coverage, for publication in State of the World Children (SOWC), and on the ChildInfo online database. To establish the processes involved and to understand the quality and completeness of the database, an extensive consultation with the UNICEF database managers took place to understand how data is collected, cleaned, summarised and used. UNICEF monitors and verifies VAS coverage from a variety of sources,[72] including:

• Campaign tally sheets: During campaigns, distributors record each child receiving vitamin A on a tally sheet. Tallies are aggregated at the centralised level and divided by an estimate of the targeted population to determine coverage. Although problems may occur with both numerators (e.g., ineligible children may receive capsules) and denominators (e.g., due to inaccurate census data or migration), these estimations are verified by surveys and rapid assessments.

• Population-based surveys: Coverage estimates are also drawn from nationally representative surveys, such as the Multiple Indicators Cluster Survey (MICS) or Demographic and Health Surveys (DHS), during which mothers or caregivers are asked if their child has received VA within the past six months. Such estimates validate tally sheet coverage estimates.

• Rapid coverage assessments: Some countries carry out coverage surveys immediately following campaign distribution. Reports are received for approximately 80 countries each year, from which SOWC estimates are derived.

After campaigns, VA coverages are calculated by head-count of the number of targeted children (6 months up to 5 years of age) recorded through tally sheets, and post-campaign rapid coverage assessments are usually conducted along with immunization campaign coverage assessments to ensure reliability of data. Annual review processes with UNICEF country offices' focal points take place for VA coverage. UNICEF headquarters data specialists analyse the coverage data with population-

based surveys (such as MICS and DHS) and the rapid assessments, which provide a relatively accurate reading of denominators, scrutinising each indicator statistically to ensure accuracy for UNICEF's annual publications of VA coverages. It is important to note that most LMICs distribute VA through ICHEs, so VA coverage usually reflect campaign coverage rather than routine distribution coverage.

The information taken from the WHO/UNICEF JRF database is an official global immunization coverage data source.[146] The WHO/UNICEF JRF immunization database includes extensive information on the vaccine delivered, type of campaign (e.g., measles SIA, polio NIDs, tetanus, etc.), date of delivery, targeted geographic area and country, and other information.[145] The key data source of the JRF database is a combination of administrative data based on reports from service providers (e.g., health centre staff, vaccination teams, private physicians) sent to WHO and UNICEF country offices, and usually household surveys which are the most common source of immunization coverage data.[146]

All vaccination programmes, both routine and campaign, collect data from clinics and vaccination teams on how many people have been vaccinated. If a vaccine is delivered through campaigns, such as for polio and measles, an estimate of campaign vaccination coverage is produced by dividing the total of these counts by the number of eligible people in the population. Administrative data report the number of vaccinations administered during a given period - usually 1 month - to local public health authorities, who review the data. The data are then aggregated and reported to the next administrative level, which is then aggregated at the national level. Rapid post-campaign surveys are also usually conducted to verify the immunization campaign coverage data reported through tally sheets along with administrative coverage. The final estimates are revised, cleaned and assessed by WHO Geneva and UNICEF New York headquarters.[146]

There are, however, several limitations in the way which vaccination coverage numerators and denominators are calculated in these campaigns.[147] For instance, there could be a potential exaggeration of the number of people vaccinated by team

members to enhance the achievements of the vaccination program. If team members are paid according to the number of people vaccinated or receive a bonus for exceeding a particular target (number of people vaccinated), there is a strong incentive for misreporting. Or, team members may simply incorrectly count or log the number of people vaccinated or the number of vaccine doses given.

As for the target population (the denominator), given that complete and accurate population census are not usually available in majority of LMICs, managers tend to estimate the number of children in the target population based on actual head counts conducted by health workers or based on village records, or rely on population projections from the latest census data.[147] The number of children vaccinated or given vitamin A is calculated at each administrative level of intervention (i.e., per village, community or health-centre catchment area), and then reported up to the next level (i.e. sub-district to district to municipality to province, and then finally to the national level). Any calculation error along the reporting chain may result in an inaccurate count of children vaccinated (the numerator).

To address these limitations of calculating numerators and denominators that may affect the accuracy of campaign coverage data, post-campaign surveys and assessments are often used to ensure that the campaign has achieved a sufficient coverage to prevent outbreaks, and to obtain more accurate coverage indicators. In these assessments, a random sample of children eligible for the vaccination is selected from the target population and their vaccination status is determined.[147]

It is important to note that UNICEF's vitamin A and WHO/UNICEF JRF immunization databases, where the CHD database draws its data from, represent the most complete and reliable source of information currently available on vitamin A and immunization campaign coverage.

Revised database. Slight alterations were made to the UNICEF CHD database by the researcher for this analysis of ICHEs. For instance, when counting the number of interventions delivered through each event, the different vaccines delivered – i.e.

measles, oral polio vaccine (OPV), tetanus toxoid or 'other antigens' (which included yellow fever, hepatitis, rotavirus) were counted as separate interventions, instead of grouping them as one intervention under 'immunization' as was done in the CHD database. Therefore, in the revised database, the total number of co-delivered interventions per event was recounted so that the different antigens could be considered as separate interventions. Events that delivered a zero or single intervention were not included in the analysis as they do not fall into the definition of ICHEs, which are defined as events that deliver two or more interventions. There were three events which delivered only one intervention (notably VA) between 2005–2010, so those events were excluded from the analysis. Measles SIAs and polio NIDs were also included in the analysis along with CHDs. As complete information on event composition was available only from 2005–2010, data from 1999–2004 were excluded from this analysis. This totalled to 597 ICHEs that were held within 2005–2010, in a total of 73 countries out of 83 that were eligible for analysis (Table 2) (Appendix 4 for list of countries). From this point on, the revised database is referred to as **ICHE database**.

Table 2 Frequency of events of the different delivery mechanisms in ICHE database
(Total of 73 countries)

Delivery mechanism	No. of Events	Percentage of total ICHE events
Child Health Day (CHD)	421	70.5
Polio national immunization day (NID)	120	20.1
Measles supplementary immunization activity (SIA)	56	9.4
Total	597	100

(More detailed information on variable descriptions in Appendix 1)

Out of 597 events included in the ICHE database, 97% of events (577 cases) had VAS coverage data, and 24% of events (142 cases in 50 countries) also indicated measles as a co-delivered intervention, among which 55% had coverage information of the vaccine. Additional measles coverage data points were not permitted to be incorporated into the dataset, though additional measles SIA events may have occurred, due to the close vigilance of measles coverage indicators by UNICEF and WHO. Therefore, 577 events were used to analyse the correlations for VA and 78 events for measles (Table 3).

Table 3 No. of events analysed per intervention

	No. of events	**% of total events** (n=597)
Vitamin A coverage available	577 (out of 597 with VA co-delivered)	97
Measles coverage available	78 (out of 142 with measles co-delivered)	13

2.2.2 Quantitative data analysis

Components of the implementation research framework were used for the basis of the analysis. Out of the 11 components, this quantitative paper (Paper 1) used strategy design, service delivery and coverage outcomes to structure the analysis. Information for other components were not part of the dataset analysed.

First, under the strategy design and service delivery components, a descriptive analysis of the global situation of ICHEs, which included CHDs, measles SIAs and polio NIDs, was conducted using Excel 2010 and Stata 10. Frequency, distribution, means, correlations and standard deviations of ICHEs, types of interventions delivered, number of interventions co-delivered during ICHEs, and different packages of interventions were measured.

Then, under the coverage outcomes component, the association of VA and measles coverage with the different numbers of interventions was explored through ordinary least squares (OLS) regression. However, since the distribution of the dependent variable (coverage outcomes of VA and measles) had a pronounced negative skew, and the distribution of independent variables (number of events) was positively skewed, a non-parametric test – the Spearman's rank correlation coefficient – was used instead. In order to test the association of coverage outcomes of VA and the different packages of interventions, a non-parametric Kruskal-Wallis test was used to compare medians. Quantitative data analysis was conducted with Stata 10 and Excel 2010 data analysis tools.

2.2.3 Study setting: Qualitative analysis

The three subsequent papers involved qualitative research, specifically a case study of Zambia. Zambia was selected as the country case study as it has a long history in implementing Child Health Week (CHWk). Its strategy has evolved through a series of iterations, including from five to 10 interventions through week-long integrated child health campaigns, since 1999, implemented by the government with support from various development partners. It has delivered five or more interventions during one child health event more frequently than any other country globally (20 times between 1999 to 2014).[14] The country also provided one of the highest number (10) of individual child health interventions in one measles-focused event in 2010,[14] during which VAS coverage reached 92% of the target population (children 6–59 months old)[83] and measles surveyed coverage of 86%. CHWk has varied over time, delivering between 2 and 10 interventions throughout the 15 years from 1999 to 2014.

2.2.4 Data collection: Qualitative analysis

The qualitative analysis also used the implementation research conceptual framework components as units of analysis, and followed a framework analysis[148] with theme-based approaches for the qualitative data analysis. Data was collected based on the 11 components of the framework: strategy design, management and monitoring, human resources, financial resources, communication, service delivery, supply, logistics, outcomes, constraints and the context. The complex interrelationship between these components was also explored, allowing for the emergence of new data points and linkages. Semi-structured interviews and document review were the main methods of data collection for this study component.

Semi-structured interviews. Semi-structured, face-to-face key informant interviews were conducted at national and district levels, with project managers, development partners and key stakeholders. Selection of informants fulfilled two criteria: respondents who have been involved in two or more years of CHWk events throughout 1999–2014, and those who are known to have had a key role in either

the planning, implementation, monitoring or evaluation of CHWk. Interviews were conducted in the capital, Lusaka, and in two designated districts. The district informants were selected based on their long experience (10+ years) working in CHWk at the district level—one peri-urban district, while the other semi-rural.

A team of three local specialists, consisting of staff with extensive experience in CHWk from the National Food and Nutrition Commission (NFNC) and UNICEF, were involved in facilitating the study. The study used purposive and snowball sampling methods for selection of key informants. The researcher provided the criteria of selection of key informants to be interviewed, and these were discussed with the team. The team then reverted with a list of interviewees that was revised and agreed upon. Further key informants were identified through recommendations by those interviewed, especially those working in the child health, nutrition and immunization sectors.

Twenty-two individuals were invited for interview, out of which a total of 17 interviews were conducted. The remaining five individuals could not be interviewed during the fieldwork period due to duty travel or absence. Key informant interviews were undertaken with health, nutrition, immunization, malaria, health communication, finance, supply and logistics specialists and district-level staff from NFNC, Ministry of Community Development Mother and Child Health (MCDMCH), Ministry of Health (MOH), UNICEF, WHO and USAID-funded projects. (Table 4)

Interviews were balanced in terms of gender and length of employment in the positions respondents occupied, ranging from 4 to 14 years (Figure 3). Six out of 17 informants interviewed had worked in planning, implementing and monitoring or supervising CHWk activities for over 10 years. Fourteen of the respondents were involved in CHWk for more than five years. Ten out of 17 informants were government staff, while seven were from development partners. Four out of 17 informants interviewed were from the district level. Most of the interviews were focused at the national level as the study was primarily interested in the extensive history of the management, implementation and evolution of CHWk. Lusaka is where

the strategic team members of the government, development partners and technical specialists were located and who had the most prominent institutional memory for the planning, coordinating, implementing and monitoring CHWk strategies.

Table 4 Characteristics of respondents

Description of Interviewees	Number of interviewees
Sector specializations	17
Overall health (covering maternal-child health, malaria, nutrition, immunization, etc.) Nutrition Immunization Communication District management	
Roles	
Area specialists/project managers Senior managers Directors	
Institutions and organizations	
• Ministry of Community Development Mother and Child Health (MCDMCH) • National Food and Nutrition Commission (NFNC) • Ministry of Health (MOH) • UNICEF • WHO • USAID-funded projects (previous employer) • Districts	

(The sample of sections are grouped together to avoid identification of the interviewees.)

Figure 3 Length of experience with Child Health Week

Semi-structured interview guides (Appendix 5) were used to explore the 11 components of the implementation research framework. The conceptual framework was used as a tool to guide the research design and the interview questions (Appendix 5), and to ensure that all relevant areas (e.g. structures, resources, processes within the health system) were covered. The interview guides allowed flexibility and the opportunity to vary the focus according to the different informants' specialization, area of work, and the level of intervention at the national or district and periphery levels, allowing for other relevant questions, prompts and issues to be included as the interviews progressed. Information sheets (Appendix 6) and consent forms (Appendix 7) were then provided to obtain consent. All 17 informants gave consent to be interviewed. Fifteen out of 17 interviews were digitally recorded after providing consent, while two informants declined to be recorded. Face-to-face interviews were conducted in English and lasted approximately one hour each, with six interviews lasting longer. Notes were also taken during interviews, and summaries of key points discussed and follow-up questions to ask the next informant were written up later during the same day. To maintain participants' confidentiality, interview data and notes were labelled with respondent codes (R1, R2, etc.)

Document review. The researcher conducted systematic literature searches using key words and phrases (see Appendix 8 for key search terms.) Secondary data were collected from an extensive search of peer-reviewed literature published in international and national journals, policy documents, country reports and other grey literature. Documents relating specifically to CHWk were obtained from MCHMCH, NFNC, UNICEF and WHO, and via electronic correspondence with key stakeholders. Some key development partners and NFNC officials were contacted through email or by telephone to obtain information and reports prior to the fieldwork in Zambia, as well as afterwards.

2.2.5 Data analysis: Qualitative analysis

The approach used in the data analysis of the qualitative research was inductive, as it aimed to explore the ICHE phenomenon from a different perspective than is

present in the existing literature, as noted in section 1.2.3. The inductive approach is an established analytical approach in exploratory qualitative research studies,[149] which focuses on new or previously researched phenomena from a different perspective.[149] This approach was chosen because of the scarcity of papers addressing the specific research questions. At the same time, a growing body of literature on health systems and implementation research have developed new frameworks, including a range of dimensions that may critically influence implementing packages of interventions. The research presented in this thesis sought to draw on these conceptual advances, adapting a conceptual framework to guide the initial analysis, but at the same time, allowing for the emergence of new dimensions and themes. Thus, the inductive and deductive approaches complemented each other.

The conceptual framework components were interrelated and encompassed a broad range of themes that were elicited in the analysis. The framework components enabled the grouping of interview questions. (Appendix 5) Initially, there were 11 components of the conceptual framework, with the number of sub-components [parent nodes] expanding to 16. (Appendix 9) NVivo 10 was fundamental in coding, sorting and assembling the data into hierarchies of codes. (Appendix 9) The sub-components led to initial codes [child nodes], which were further coded into more detailed codes (80+) and groupings of ideas and issues that emerged. (Figure 4) As the analysis progressed, more detailed codes and groupings of ideas and issues emerged, and were then organised into hierarchies as their meaning and relationships were refined.

For instance, themes that fell under the Strategy Design component were broken down and coded as: coordination, partnerships, decision-making, contradictory policies, planning, date-setting, decision of interventions, district planning, and strategy. When developing the narrative, the full set of codes were grouped into higher-level themes organised under sub-headings in Papers 2, 3 and 4. For example, in Paper 4, Section 6.5.6 “Supplementing health workers for Child Health Weeks” encompassed human resources, financial resources, logistics and service delivery

components. It would not have been possible to discuss the need of finding additional health workers for CHWk due to lack of human and financial resources, as well as other logical and service delivery constraints, if the findings were explained under each of the different components. The research questions could not have been answered as sufficiently or coherently if the findings were explained under the sub-headings pertaining to the components, as the data would be skewed under some components. The interrelations of the components among the main themes and subheadings in paper 3 are shown in Table 5.

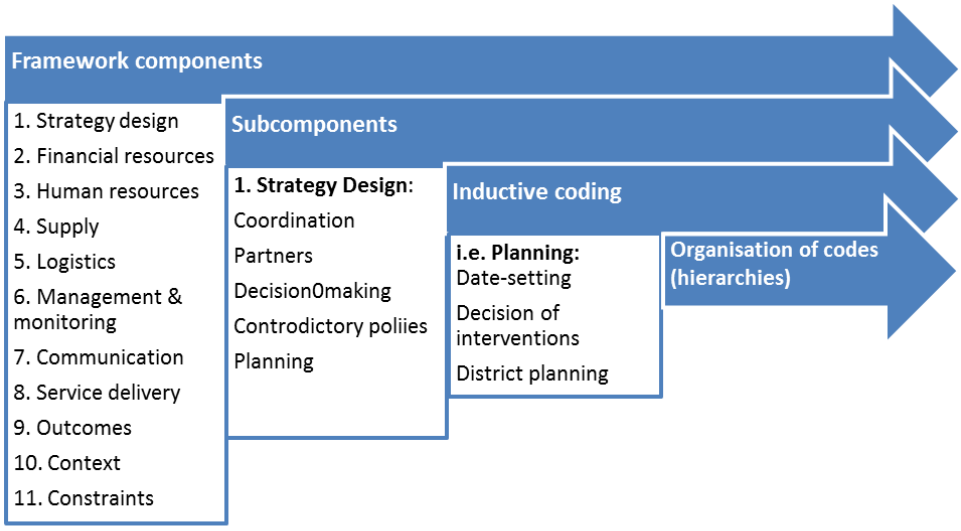

Figure 4 Process of data analysis: Framework components into codes

The sub-headings of the findings and discussion sections in Papers 2, 3 and 4 refer more specifically to the codes, which were the base of the themes. For instance, in Paper 3, the limited staff and heavy workload sub-headings explore the relationship of the constraints in implementing ICHE. This in turn is related to the issue of the burden on the districts' health financing and human resources for health. Breaking down the data in differing codes enabled the researcher to see patterns, repeating themes, and key declarations from respondents that came out throughout the analysis. The results and findings were presented by common themes that were derived from the data analysis.

Table 5. Major themes and findings in relation to Conceptual framework components

Section	Framework components	Themes / Subheadings (Paper 3)
5.5.1.1	6. Management, monitoring 10. Context	Coordination, synergies, partnerships
5.5.1.2	7. Communication	Social-mobilization
5.5.1.3	6. Management, monitoring 10. Context	Government stewardship
5.5.2	1. Strategy design 6. Management, monitoring 8. Service delivery 10. Context	Types and number of interventions
5.5.3	1. Strategy design 10. Context	Piloting
5.5.4	6. Management, monitoring	District as focal points for CHWk
5.5.5	1. Strategy design 10. Context	Policy modifications at district levels
5.5.6.1	2. Financial resources 3. Human resources 5. Logistics 11. Constraints	Constraints: human resources
5.5.6.2	5. Logistics 8. Service delivery	Constraints: decrease in quality
5.5.6.3	5. Logistics 6. Management, monitoring 10. Context	Constraints: long waiting
5.5.6.4	6. Management, monitoring	Constraints: reporting

2.3 Ethical issues

Ethical approval for the study was obtained from LSHTM (5886-28-01-11) and the University of Zambia Biomedical Research Ethics Committee (UNZAREC) (0211-256067). For the quantitative component, approval to use the CHD database was obtained from UNICEF. For the qualitative component, informed consent was obtained from all interviewees and results were reported in an anonymous manner. Written consent forms, textual data and recordings were kept securely by the researcher at all times.

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RESEARCH PAPER COVER SHEET

PLEASE NOTE THAT A COVER SHEET MUST BE COMPLETED FOR EACH RESEARCH PAPER INCLUDED IN A THESIS.

SECTION A – Student Details

Student	Mahoko Kamatsuchi
Principal Supervisor	Dina Balabanova
Thesis Title	Learning from Implementation of Integrated Child Health Events: Lessons from Global Practice and the Experience of Zambia

If the Research Paper has previously been published please complete Section B, if not please move to Section C

SECTION B – Paper already published

Where was the work published?			
When was the work published?			
If the work was published prior to registration for your research degree, give a brief rationale for its inclusion			
Have you retained the copyright for the work?*	Choose an item.	Was the work subject to academic peer review?	Choose an item.

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SECTION C – Prepared for publication, but not yet published

Where is the work intended to be published?	Journal of Infectious Diseases
Please list the paper's authors in the intended authorship order:	Mahoko Kamatsuchi, Adrian Gheorghe, Dina Balabanova
Stage of publication	**Not yet submitted**

SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	MK conceived and designed the analysis. MK analyzed the data. AG oversaw the data analysis. MK DB wrote the manuscript. MK DB AG read and approved the final manuscript.

Student Signature: _____ **Date:** 27 May 2016

Supervisor Signature: _____ **Date:** 27 May 2016

Chapter 3 - Paper 1: Delivering multiple interventions through integrated child health events globally: scale, nature and implications for coverage

3.1 Abstract

Background

Seeking to accelerate progress to reduce under-five mortality rates in low- and middle-income countries (LMICs), mass distribution of cost-effective maternal and child health and nutrition interventions through integrated child health events (ICHEs) have evolved and been widely used since 1999. Currently, there is a trend towards increased numbers of interventions delivered through ICHEs.[2,49,93][2,49,93] However, it is unclear whether coverage outcomes of specific interventions, such as vitamin A supplementation (VAS) and measles vaccine, are associated with the numbers of co-delivered interventions and the types of package delivered.

Objective

To examine the association of VAS and measles vaccine campaign coverages with the numbers of interventions, and the association of VAS coverage with the different types of package of intervention delivered through ICHEs.

Methods

Secondary data analysis was conducted using UNICEF CHD global monitoring database, including CHDs, SIAs and NIDs data obtained between 1999–2010. A total of 597 ICHEs were analysed from 76 countries. The range of the number of interventions delivered in a single event through ICHEs was two to 11. A descriptive statistical analysis was first conducted with Excel 2010 and Stata 10. Spearman's rank correlation coefficient (rho) analysis was used to assess the association of the number of interventions delivered with VAS and measles coverage; and Kruskal-Wallis analysis to test the association of different packages of interventions with VAS coverage.

Results

Vitamin A supplementation (VAS) administrative coverage data showed 75% of coverage outcomes ranged between 80–100%, and 56% (325 events) ranged equal to or above 90% regardless of the different numbers of co-delivered interventions. Campaign coverage data for measles showed 79% of coverage outcomes were greater than 90%, with overall median coverage of 96% and mean coverage of 91%. There was a weak statistically significant inverse association between VA coverage and number of intervention (Spearman's coefficient= -0.09; p=0.02). There was a weak association between measles coverage and number of intervention (p=0.05). Finally, there was no significant association of the different packages of interventions on VAS coverage (p=0.07).

Conclusions

There was no strong evidence of any co-relation between VAS coverage or measles coverage with number of interventions. There was also no association between VAS coverage and the different package of co-delivered interventions. Further research is needed to investigate specific country contexts that enabled the countries to successfully deliver large numbers of interventions and still achieve high coverages of VAS and measles vaccines delivered through ICHEs.

3.2 Introduction

As noted by the MDG Health Alliance, a potential driver to accelerate progress to reduce child mortality beyond MDG 4 is pursuing the multiple delivery of interventions through integrated child health campaigns.[150] However, it remains unknown whether the coverage outcomes of specific interventions, such as VAS and measles, are associated with the number of interventions delivered or with the different packages of interventions. 'Coverage outcome' in this study refers to the percentage of children who received an intervention.

Expanding access to cost-effective child health services through ICHEs has been recognized as a viable strategy and implemented in many settings in recent decades to accelerate the reduction of child mortality in low-income countries. Though this has occurred in parallel to other mainstream models of delivery of key child health interventions, in countries where access to health services is problematic and the health system is weak, a nationwide campaign approach has proved to be an essential element health service delivery to reach as many children as possible in a relatively short period of time.[1,26,28,40-42]

Integrated child health events (ICHEs) can be broadly defined as any campaign-style events that deliver two or more maternal and child health and nutrition services at any given time during any given year. There are two main categories of ICHEs which are analysed in this paper: 1) *Child Health Days (CHDs)*, or events generally conducted every six months, organized to deliver two or more health and/or nutrition services to infants, children under the age of 5, and, in some cases, pregnant or lactating women.[1] The difference between ICHEs and CHDs is that ICHEs are more inclusive because the definition includes any campaign that is given at any frequency any time of the year, whereas CHDs are conducted twice a year, usually in six months apart; and, 2) *disease-prevention immunization-focused campaigns*, which are events focused on eradicating or controlling specific diseases. Their frequency is based on disease-control priorities and is linked to disease outbreaks.[102] The two immunization-focused campaigns which are included in this analysis are measles SIAs and polio NIDs. *Measles SIAs* target all children in a defined age group with the

objective of reaching those who have never had measles vaccines, and to provide an opportunity for a second dose for cases of primary vaccine failure.[103,104] It is now very common to deliver additional child survival interventions along with the measles vaccine through SIAs.[2,105] In 2011–2012, for instance, out of 35 measles SIAs conducted in the African region alone, 23 (66%) had one other child health or nutrition intervention delivered.[106] *Polio NIDs* are mass immunization campaigns conducted in two rounds, approximately one month apart, with the aim of interrupting the circulation of poliovirus by immunizing every child under five years with two doses of oral polio vaccine (OPV).[107] The co-delivery of VAS[69,71] and in many instances deworming tablets[99,151-153] during polio NIDs proved to be an effective mechanism to deliver various interventions reaching vast numbers of children under 5.[99,154] Other types of disease prevention campaigns were not fully captured in the dataset used in this study. This analysis focused on the combinations of three types of ICHEs – CHDs, measles SIAs and polio NIDs – for which information on the interventions delivered during these campaigns was available in UNICEF's CHD database.[145]

Many low- and middle-income countries (LMICs) have been able to provide other health services on a periodic basis in order to take advantage of available resources and 'piggy-back' on existing delivery mechanisms.[53,69,73,74,79,80] A growing body of evidence has confirmed that the delivery of child health and nutrition interventions through immunization delivery channels has helped to achieve rapid, high and equitable coverage[110,116-120] at low cost.[84,85,88,93,94,121-126] There are also indications that integrated delivery such as CHDs and SIAs contribute to improved immunization coverage.[41,118,155] Other studies showed SIAs improving access and efficiency[110] and reducing disease outbreaks,[98,103] and CHDs greatly enhancing VAS and other intervention coverage outcomes.[82,151,156,157] Where routine immunization is strong, immunization contacts were found to serve as excellent vehicles for delivering additional interventions.[11,53]

Countries are increasingly adding to the package of interventions delivered throughout these campaigns.[1,54,106] Drawing on the literature on vertical versus

horizontal programmes and associated issues, the hypothesis is that increasing the number of interventions delivered through ICHE may negatively affect the coverage of these interventions. This hypothesis emerged based on existing studies, many of which analyse vertical modes of delivery,[25,43,158,159] suggesting that increasing the volume of services delivered at one time, may lead to higher financial and human resource burden on the districts and health workers, therefore affecting performance and coverage of the interventions. As the same health worker needs to oversee more tasks, the different combinations of interventions delivered through ICHEs is expected to have a negative association with coverage outcomes.

This study advances the knowledge beyond the only other analysis[1] using the CHD database which only focused on CHDs and did not consider SIAs or NIDs. This significantly narrows their analysis, as it only portrays one type of ICHEs. (Appendix 3) Utilising the CHD database, which was slightly modified to create the ICHE database for this study, this research addresses this gap, providing a comprehensive picture of ICHEs by analysing the main child health campaign models implemented globally: CHDs, measles SIAs and polio NIDs. This analysis examines, also for the first time, the association of the number of interventions and the package of interventions delivered through ICHEs and their potential impact on coverage outcomes. The comprehensive approach taken in this thesis represents a distinct contribution to the literature with significant implications for policy and practice.

3.3 Objectives

1. To examine the association between the different number of interventions delivered through ICHEs and vitamin A (VA) and measles coverage outcomes.
2. To analyse the association between vitamin A coverages and the different intervention packages delivered through ICHEs.

3.4 Methodology

3.4.1 Data description

Original UNICEF CHD database. A global database of CHDs[83] was obtained with permission from UNICEF Health and Nutrition sections at the New York headquarters in 2010, and an updated version was received in 2013.[145] This is the version used in this analysis. This original database contained information of various integrated child health events from 83 countries from 1999–2010.

Data in the CHD database were compiled from UNICEF's VA database and the WHO/UNICEF Joint Reporting Form (JRF) immunization database. UNICEF has collected VAS coverage data annually since 1999, and from 2005 has captured information of different types of health service delivery mechanism, and coded them as CHD, SIA, polio NID or 'ongoing routine'. The CHD database is maintained and updated by the UNICEF Nutrition section. Annual review processes with UNICEF country offices' focal points take place for vitamin A coverage for publication in State of the World Children (SOWC) and on the ChildInfo online database.[72]

The WHO/UNICEF JRF immunization database includes extensive information on the vaccine delivered, type of campaign (e.g., measles SIA, polio NIDs, tetanus, etc.), date of delivery, and targeted geographic area and country, among others.[145] The key data source of the JRF database is a combination of administrative data based on reports from service providers (e.g. health centre staff, vaccination teams, private physicians) sent to WHO and UNICEF, and immunization coverage surveys.[146] The final estimates are technically assessed by WHO and UNICEF on the performance of national immunization systems.[146] UNICEF's vitamin A and WHO/UNICEF JRF immunization database represent the most complete source of information currently available on vitamin A and measles immunization campaign coverage data, and UNICEF CHD database is the only database available that has assembled information on integrated child health campaigns on a global scale.

Data on co-delivered interventions in the UNICEF CHD database are VAS, immunization, 'different antigens' (i.e., measles, polio, tetanus toxoid), deworming, distribution or retreatment of insecticide-treated nets (ITNs); growth monitoring (GM), water, sanitation and hygiene (WASH), behaviour change communication (BCC) and 'other services'. Descriptions of 'other services' such as family planning and HIV-prevention as well as BCC messages were noted in some events. Some SIAs and NIDs were also coded as CHD if an event was held approximately six months immediately prior to or immediately following another similar child health event. SIAs or NIDs that did not meet the six-monthly schedule were not coded as a CHD event but were coded as measles SIA or polio NID[1] (Appendix 2). There are occasional coverage levels reported over 100% in the UNICEF CHD database, usually as a result of systematic error in the numerator or denominator, a change in target age groups, or inclusion of children outside the target age group in the numerator. For coverage reported over 100% in the UNICEF CHD database, this was calculated as 100% coverage.

Revised database. Slight alterations were made to this original UNICEF CHD database for this analysis, such as different vaccines delivered – i.e. measles, oral polio vaccine (OPV), tetanus toxoid or 'other antigens' (which included yellow fever, hepatitis, rotavirus) were recounted as separate interventions instead of grouping them together under 'immunization', resulting in a different number of interventions for each event. Events that delivered no intervention or one intervention were not included in the analysis as they do not fall into the definition of ICHEs. There were three events which delivered only one intervention (notably VA) between 2005–2010, hence those events were excluded from the analysis. Events coded as measles SIAs and polio NIDs were also included in the analysis along with CHDs. As complete information on event composition was available only from 2005–2010, data from 1999–2004 were excluded from this analysis. This totalled to 597 ICHEs that were held within 2005–2010, in a total of 73 countries out of 83 that were analysed (Table 2). From this point on, the revised database is referred to as **ICHE database**.

Out of 597 events included in the ICHE database, 97% (577 cases) had VAS coverage data, and 24% (142 cases in 50 countries) also indicated measles as a co-delivered intervention, among which 55% had coverage information of the vaccine. Additional measles coverage data points were not permitted to be incorporated into the dataset though additional measles SIA events may have occurred, due to the close vigilance of measles coverage indicators by UNICEF and WHO. Therefore, for analysis, 577 events were used to analyse the correlations for VA and 78 events for measles (Table 3).

3.4.2 Data analysis

The study used the components of the implementation research conceptual framework as units of analysis (Figure 1). Out of the 11 components of the implementation framework, this paper used strategy design, service delivery and coverage outcomes to structure the analysis. Under strategy design and service delivery, a descriptive analysis of the global situation of ICHEs that included CHDs, measles SIAs and polio NIDs was conducted using Excel 2010 and Stata 10. Descriptive statistics were used to measure types of intervention delivered, number of interventions co-delivered during ICHEs, and different package of interventions.

Under coverage outcomes, the association of VA and measles coverage with the different numbers of interventions was explored through ordinary least squares (OLS) regression. However, as the distribution of the dependent variable (coverage outcomes of VA and measles) had a pronounced negative skew, and the distribution of the independent variable (number of events) was positively skewed, a non-parametric test called the Spearman's rho was used. To test the association of coverage outcomes of VA and the different packages of interventions, a non-parametric Kruskal-Wallis test was used to compare medians.

The number of interventions per event was categorized as either low (two to four interventions) or high (at least five interventions); the cut-off was informed empirically by an examination of the distribution of number of interventions per event, exhibiting a right skew commencing at five interventions per event.

3.5 Ethics

Ethical approval for the study was obtained from the London School of Hygiene and Tropical Medicine (LSHTM) (5886-28-01-11). Approval to use the UNICEF CHD database was obtained from UNICEF Health and Nutrition sections.

3.6 Results

3.6.1 Strategy design: Distribution and frequencies of ICHEs

The highest occurrence of ICHEs was in sub-Saharan Africa (62%), followed by East and Southern Asia and Pacific (26%) (Figure 4). The number of ICHEs conducted each year has been relatively stable, averaging approximately 100 events globally per year in the period 2005 to 2010 (Figure 6). This demonstrates a significant reliance on delivering multiple interventions through the ICHEs in LMICs.

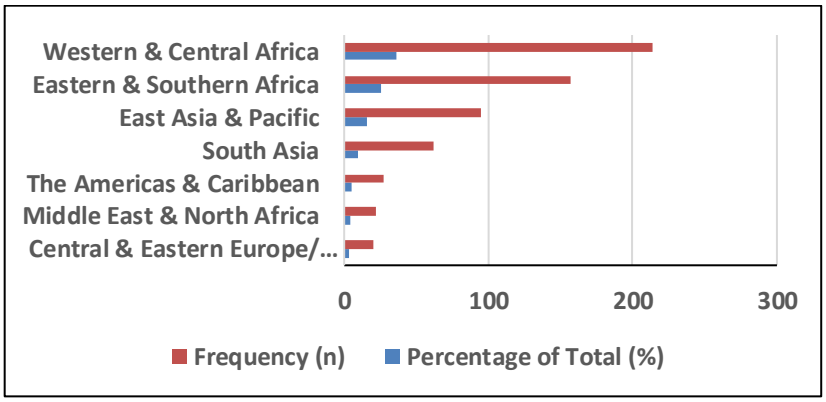


Figure 5 Integrated child health events distribution, per region (2005–2010)

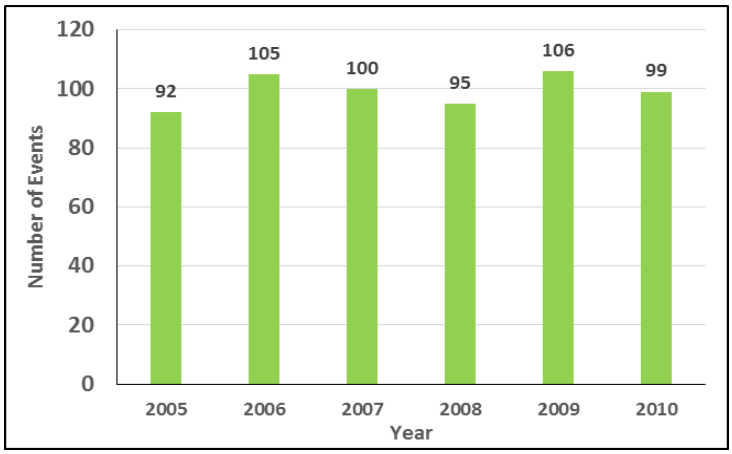


Figure 6 Number of ICHEs by year, globally (2005–2010)

3.6.2 Strategy design: Types of intervention delivered

Among the 597 ICHEs, VA (99%), deworming (70%) and OPV (46%) were the most common interventions delivered (see Appendix 11). Despite the diversity of services delivered, there was no apparent global pattern with regard to when certain interventions were introduced into an ICHE. OPV and measles vaccines, ITN and WASH interventions were delivered in a varying numbers of events throughout the six-year time span, though there appears to be an increase of the delivery of OPV, measles and ITNs around 2008–2010 (Figure 7). See Appendix 12 for other types of interventions co-delivered in 2005-2010.

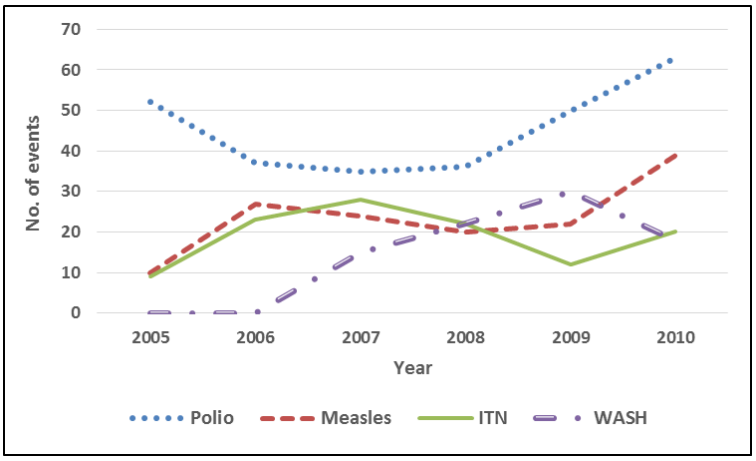
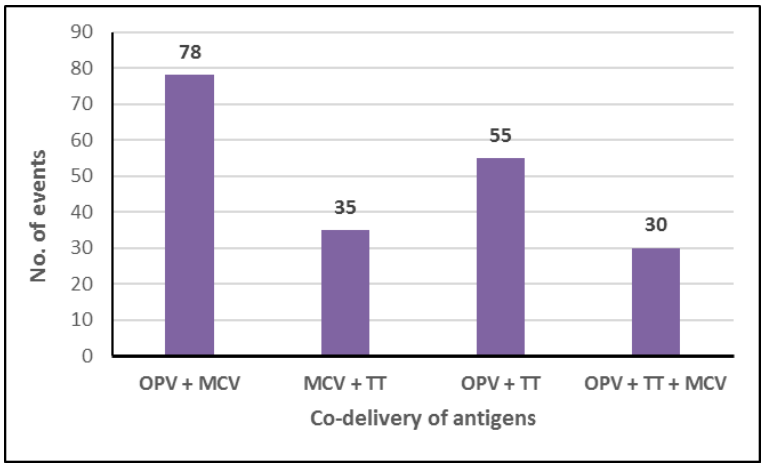


Figure 7 Diverse interventions delivered by year, 2005–2010

In terms of the combinations of antigens delivered together, out of the 597 events, 78 co-delivered OPV and measles; 55 co-delivered OPV and tetanus toxoid (TT); 35 delivered measles and TT; and 30 co-delivered OPV, measles and TT (Figure 8). As noted earlier, these antigens were counted as separate interventions since the different vaccines are not generally delivered together. Injectable vaccines require skilled health personnel, while OPV can be (and is increasingly) administered by community workers/volunteers. Measles and TT injections also require additional resources, skill and time to administer the vaccine, such as syringes, safe syringe disposal techniques and other skills which could influence the coverage outcomes of the campaigns.



OPV = oral polio vaccine; MCV – measles containing vaccine; TT = tetanus toxoid

Figure 8 Co-delivery of antigens in integrated child health events

3.6.3 Strategy design: Number of interventions co-delivered during ICHEs

Overall, the range of the number of child survival interventions delivered through a single ICHE was 2 to 11. The trend to deliver five or more interventions during one ICHE gained momentum since 2005, increasing the proportion of countries delivering a high number of interventions with each passing year. In contrast, the number of countries which delivered two to four interventions decreased steadily (Figure 9).

After 2007, more countries began to add on services, with 82% of the total events delivering three or more interventions. In 2010, five countries out of 73 started to deliver 10 to 11 simultaneous interventions through existing ICHEs, exemplifying the high volume of interventions that countries have attempted to deliver through these campaigns. In 2010, forty events out of 66 (60%), across 24 countries, delivered five or more interventions during one campaign (Table 6, Figure 9). This pattern was particularly common in sub-Saharan Africa; out of the 24 countries, 75% were countries in the region (Figure 11).

The increasing shift towards co-delivered services was particularly marked in West and Central Africa, in addition to Eastern and Southern Africa. The proportion of ICHEs including five or more interventions was predominantly in sub-Saharan Africa, representing 71% of all events (Figure 12).

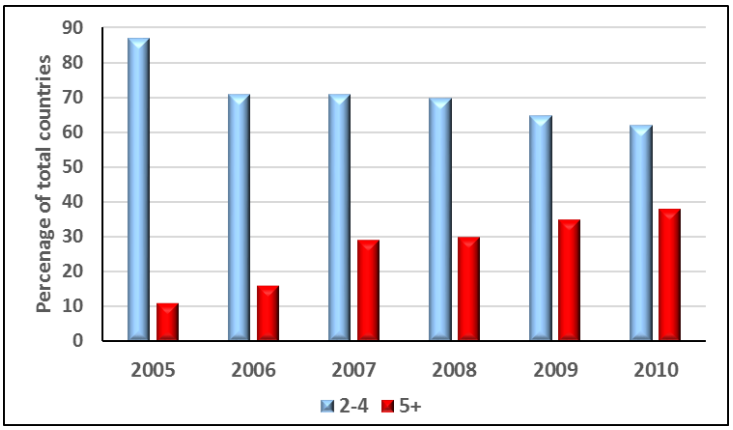


Figure 9 Number of countries which delivered two to four interventions vs five or more interventions, 2005–2010

Table 6 Number of countries delivering 2-11 interventions, global (2005–2010)

No. of interventions	2005	2006	2007	2008	2009	2010	Total
2	29	32	16	13	11	9	**110**
3	18	25	24	20	21	21	**129**
4	14	14	16	23	20	15	**102**
5	7	5	12	9	9	7	**49**
6	1	6	8	7	8	5	**35**
7	1	1	3	4	8	4	**21**
8				3	1	5	**9**
9		2		1	2	2	**7**
10						3	**3**
11						2	**2**
Total	**70**	**85**	**79**	**80**	**80**	**73**	

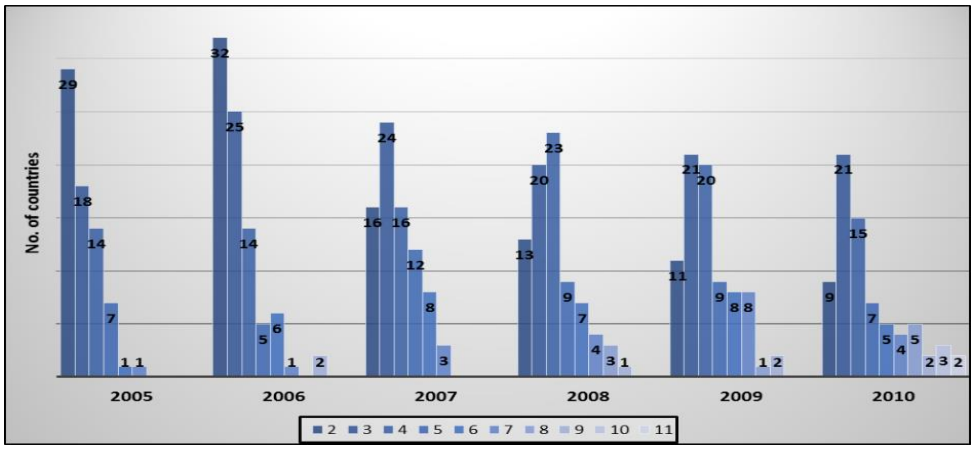


Figure 10 Number of countries delivering multiple interventions, by year

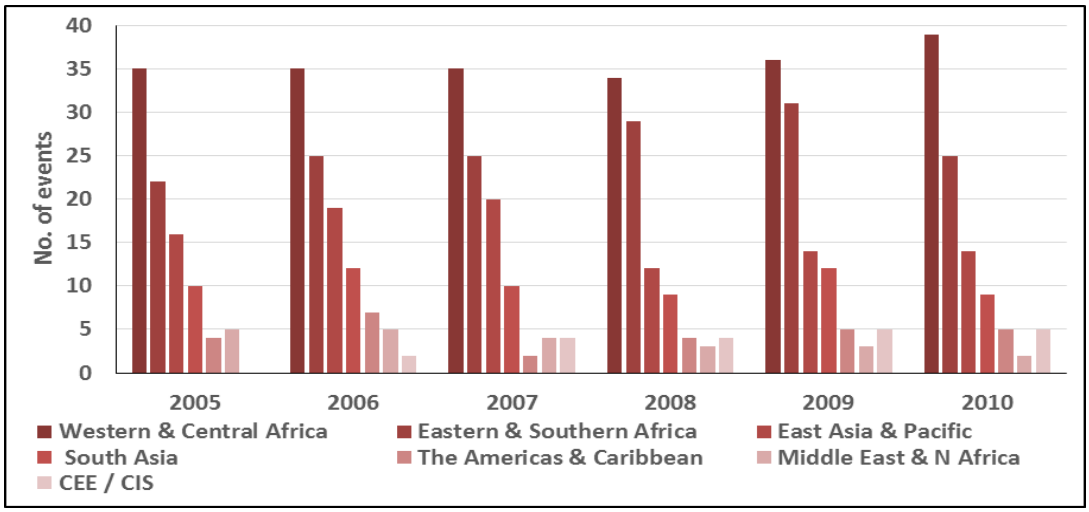


Figure 11 Number of ICHEs by year, regional (2005–2010)

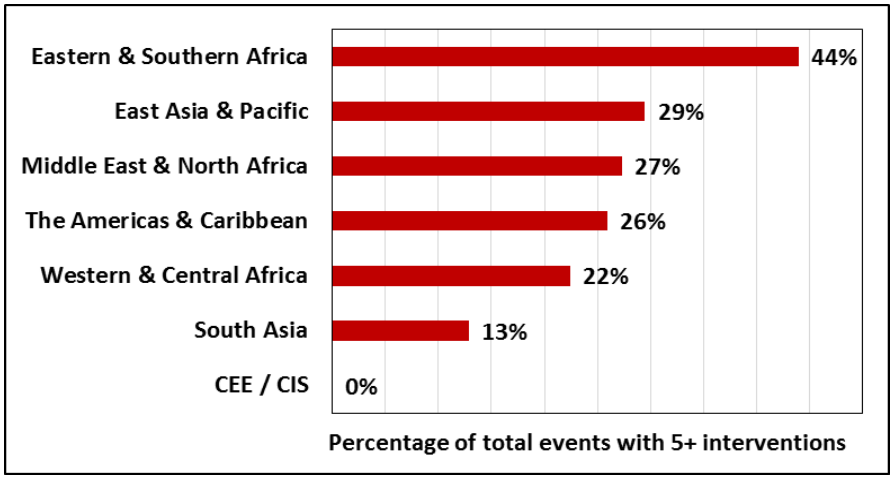


Figure 12 Proportion of regions delivering five or more interventions during ICHE, 2005–2010

(% of total events with five+ interventions)

The top countries which delivered five or more interventions are listed in Table 7. The two top-ranking countries, Nigeria and the Philippines, delivered 11 interventions in 2010 (Box 1), followed by 10 interventions in the same countries along with Zambia. Nicaragua, Somalia, South Sudan, Nigeria, Madagascar, Ghana and Uganda have delivered nine interventions at once in varying years, all delivering a variety of packages of maternal and child health interventions.

Table 7 Countries which delivered five or more interventions during ICHEs (2005–2010)

Country	Year	No. of Interventions
Nigeria, Philippines	2010	11
Nigeria, Philippines, Zambia (2x)	2010	10
Nicaragua, South Sudan	2010	9
Nicaragua, Nigeria, Somalia (2x)	2009	9
Madagascar	2008	9
Ghana, Uganda	2006	9
Burundi (2x), Mozambique (2x), Rwanda (2x), Sudan, Uganda (2x)	2010	8
Sierra Leone	2009	8
Madagascar, Nigeria, Rwanda	2008	8
Cameroon (2x), Congo DR, Sierra Leone (2x), Vietnam (2x)	2010	7
Angola, Burkina Faso (2x), Ethiopia, Sierra Leone, South Sudan, Togo, Uganda (2x), Zimbabwe	2009	7
Philippines, Sierra Leone, Sudan, Zambia	2008	7
Indonesia, Nigeria, Zambia	2007	7
Uganda	2006	7
Cambodia	2005	7
Haiti, India (2x), Lao PDR (2x), Madagascar, Somalia (2x)	2010	6
Burundi, Central African Republic, Eritrea, Ethiopia, Nigeria, Swaziland, Vietnam (2x), Zambia (2x)	2009	6
Djibouti, Ghana, Kenya (2x), Mozambique, Nigeria, Philippines, Zambia	2008	6
Central African Republic (2x), Djibouti, Ghana, Indonesia, Malawi, Nigeria, Philippines (2x), Timor Leste (2x)	2007	6
Ethiopia (2x),Ghana, Indonesia, Madagascar, Nicaragua, Zambia (2x)	2006	6
Zambia (2x)	2005	6
Burkina Faso (2x), Cote d'Ivoire, Ethiopia, Liberia, Madagascar, Niger, Senegal	2010	5
Burundi, Chad (2x), Ecuador, Guinea, Lao DPR, Korea DPR (2x), Rwanda (2x), Senegal, Zimbabwe	2009	5
Burkina Faso (2x), Congo DR, Ghana, India (2x), Korea DPR, Togo, Tanzania, Uganda (2x), South Africa	2008	5
Eritrea (2x), Ethiopia (2x), Gabon, Cambodia, Marshall Island (2x), Mali, Nicaragua, Korea DPR, Swaziland, Uganda, Zambia, Zimbabwe	2007	5
Angola, Belize (2x), Kenya, Maldives (2x), Sierra Leone	2006	5
Burundi, Ethiopia (2x), Ghana, Maldives (2x), Philippines (2x), Senegal, Uganda	2005	5

Note: '2x' indicates that the country has conducted an ICHE twice that year with the same number of interventions

Box 1
What is included in an extensive package of interventions?
Nigeria and the Philippines

In both Nigeria and the Philippines, the package of interventions included: vitamin A, oral polio vaccine, measles, tetanus-toxoid and routine vaccines, deworming, insecticide-treated nets distribution, growth monitoring, water, sanitation & hygiene (WASH), behaviour change communication (BCC), nutritional screening and iron folate supplementation for pregnant women. BCC contents for the Philippines included messages in the promotion of prevention of chronic non-communicable diseases such as tobacco avoidance, child injury prevention, iodine salt testing and oral hygiene.

The question of whether the same countries tend to deliver five or more interventions at one event was also explored. Zambia ranked the highest in this respect (12 occurrences), with a delivery of five or more interventions in 2005–2010 (Table 8). In Zambia's case, between five and seven interventions were delivered between 2005 to 2009, but the number of interventions increased in more recent years (2010 and 2012), especially with the adoption of the strategy to achieve nationwide measles coverage through measles SIA (Zambia field interviews with Health & Nutrition project managers, May 2014). Uganda had 10 occurrences of delivering five or more interventions between 2005–2010; Ethiopia, nine occurrences, and Nigeria and the Philippines eight occurrences, followed by Ghana, Burkina Faso and Sierra Leone, Burundi, Madagascar and Rwanda with five or six occurrences. These countries have sought to deliver very high numbers of services in one event, relying on campaign-style delivery mechanisms.

Table 8 Top countries and frequency with which those countries delivered more than five interventions during an integrated child health event (2005–2010)

Countries that delivered five or more (5+) interventions	No. of occurrences
Zambia	12
Uganda	10
Ethiopia	9
Nigeria, Philippines	8
Ghana	7
Burkina Faso, Sierra Leone	6
Burundi, Madagascar, Rwanda	5

3.6.4 Strategy design: Package of interventions

The most common interventions and the most frequent combination of interventions delivered through ICHEs were of VA, OPV and deworming (Figure 12). The full list of 188 packages found are given in Appendix 13.

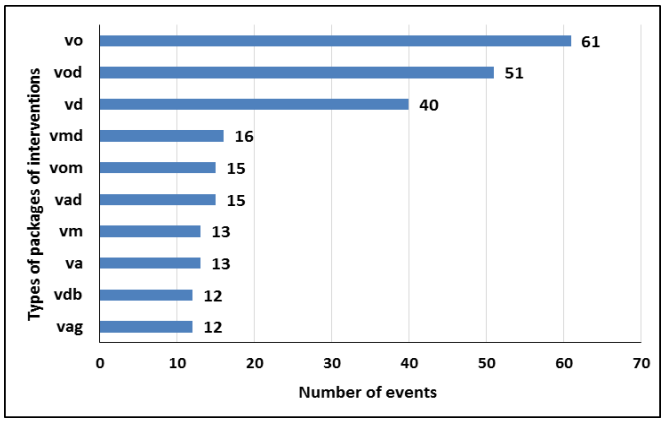


Figure 13 Top 10 most frequent packages delivered via ICHEs (2005–2010)

Table 9 Definition of package variables

Variable	Definition
v	Vitamin A
o	Oral polio vaccine
d	Deworming
m	Measles-containing vaccine
a	Other antigens (Include: yellow fever, hepatitis, rotavirus, unidentified immunization)
b	Behaviour change communication
g	Growth monitoring
t	Tetanus-toxoid vaccine
n	ITNs
w	Water, sanitation & hygiene

3.6.5 Coverage outcome: Number of interventions and vitamin A coverage

Vitamin A supplementation coverage data showed that 75% of reported coverage outcomes ranged between 80–100%, and 56% (325 events) ranged equal to or above 90% (Figure 13). VA coverage data showed a negatively skewed distribution (Figure 15), where the mean (85%) was lower than the median (92%). Figure 16 shows the median VA coverage by year.

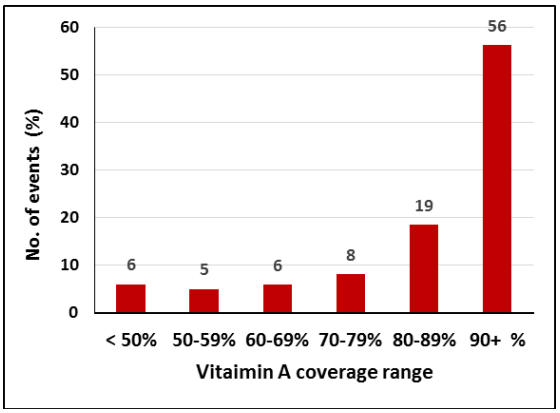


Figure 14 Distribution of vitamin A coverage in ICHEs, global (2005–2010)

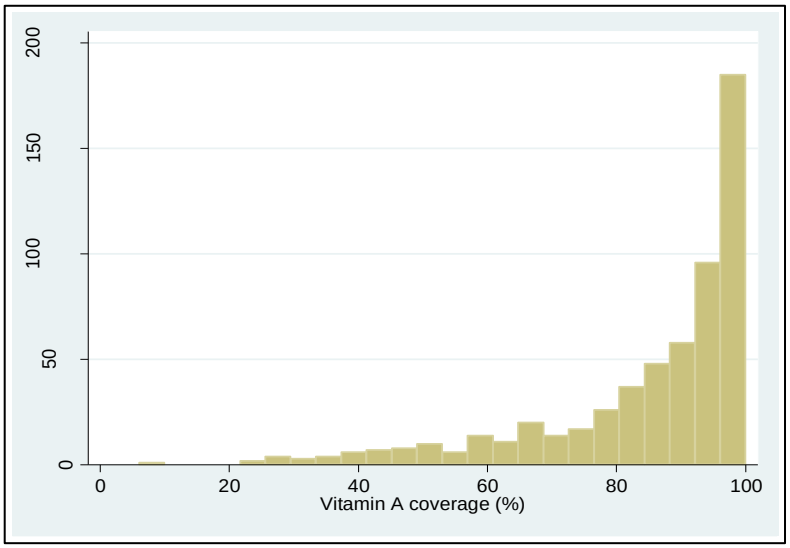
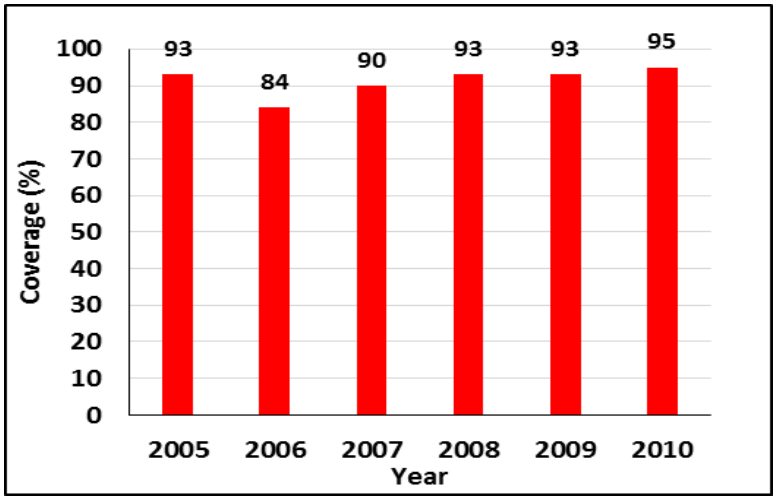


Figure 15 Distribution of vitamin A coverage



(n=574)

Figure 16 Median vitamin A coverage in ICHEs by year, globally, 2005–2010

Considering all ICHEs, the correlation of the number of co-delivered interventions with VAS coverage was explored. The regression table suggests that, on average, one additional intervention decreases VA coverage by 0.76% (Table 10). However, as the distribution of the dependent variable (VA coverage) had a pronounced negative skew (Figure 15), and the distribution of independent variable (number of events) was positively skewed (Figure 17), the residuals of the regression were not normally distributed. Hence, the standard errors of the regression coefficients are very likely to be biased. Therefore, a non-parametric measure of association, the Spearman's rho and its *p*-value, was used to explore the relationship between VA coverage and number of interventions.

Table 10 Regression results(a) – Vitamin A coverage, number of interventions

Model		Unstandardized Coefficients		Standardized coefficients	t	*p*-value
		B	Std. Error	Beta		
1	(Constant)	88.161	1.745		50.516	.000
	VA coverage	-.766	.407	-.078	-1.879	.061

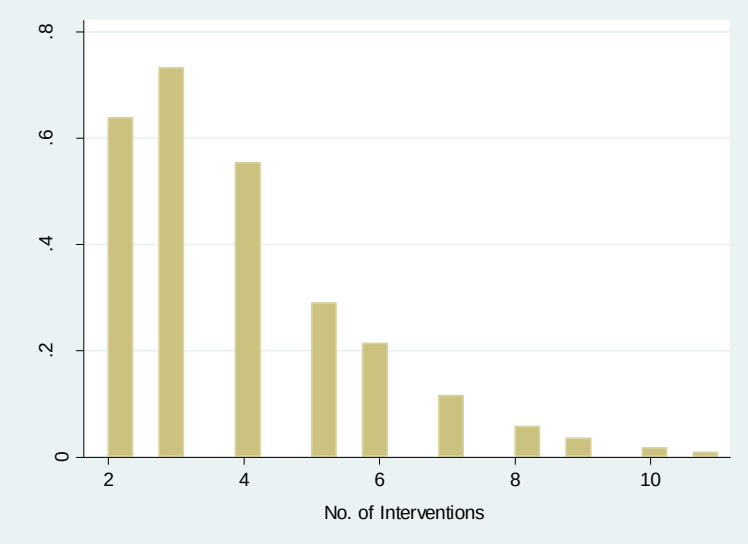


Figure 17 Distribution of number of events

As seen in Figure 18, there is no apparent linear relationship between VA coverage and number of interventions. In addition to accommodating the non-normality of the two variables, Spearman's rho accounts for a potential non-linear relationship

between the two. Though it was statistically significant at 5% level (p=0.02), the correlation was weak and negative (-0.09) (Table 11).

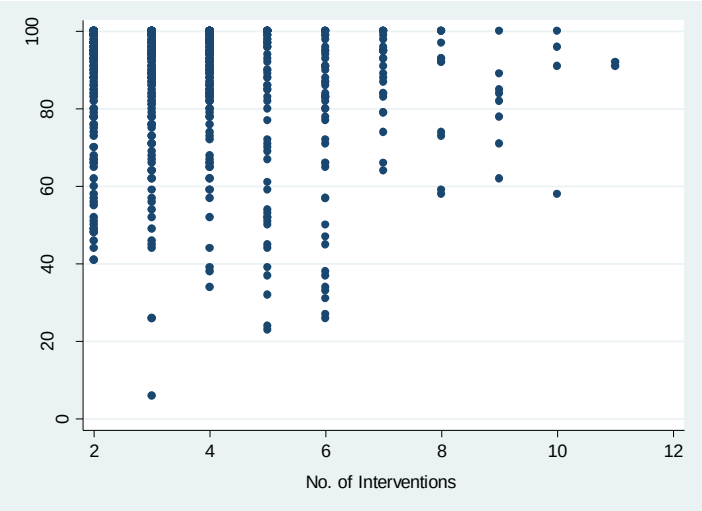


Figure 18 Coverage of vitamin A versus number of interventions

Table 11 Spearman's Rank Correlation Coefficient results: Vitamin A coverage, number of interventions

Spearman's rho = -0.0974
p-value = 0.0193
Dependent variable: VA coverage outcome
Independent variable: number of interventions

Some variation may be seen due to reporting or data collection and aggregation errors. For example, vitamin A coverage appears to be lower when six and nine interventions were delivered compared to ICHEs delivering different numbers of interventions (Figure 19), and this might be due to random fluctuation. But there is no apparent reason to expect a systematically lower coverage only in ICHEs with six or nine interventions, as this may well be an artefact. There are countries that showed VA coverages in the low 20s and 30s during several CHD events while delivering six interventions, which may have decreased the median VA coverages for events that delivered six interventions. Yet, the same countries reached over 90% when delivering less or more than six interventions.

It is expected that over the years, as interventions were added or removed, the association of coverage and number of interventions may change. The associations

with Spearman's rho for VA coverage and number of interventions conducting during the events in the early and latest years of the study period (2005 and 2010) were explored. This analysis demonstrates that the correlation was not significant (p=0.19, p=0.43 respectively), therefore suggesting a non-significant association between the level of VA coverage and the number of interventions for those years. (Table 12)

Table 12 Vitamin A coverage and number of interventions in early and later years (2005, 2010)

	2005	2010
n	85	99
Spearman's rho	-0.14	-0.08
p-value	0.19	0.43
Dependent variable: vitamin A coverage Independent variable: number of interventions		

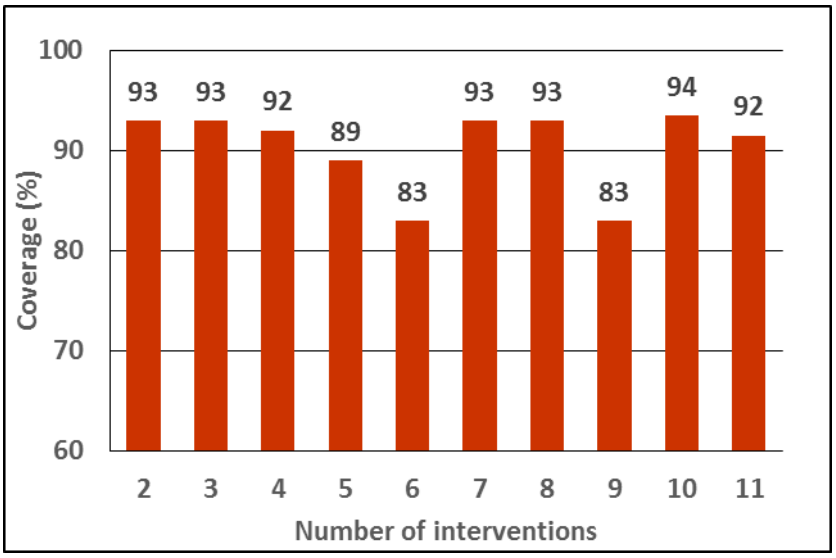


Figure 19 Vitamin a coverage by number of interventions, global (2005–2010)

3.6.6 Coverage outcome: Number of interventions and association with measles coverage

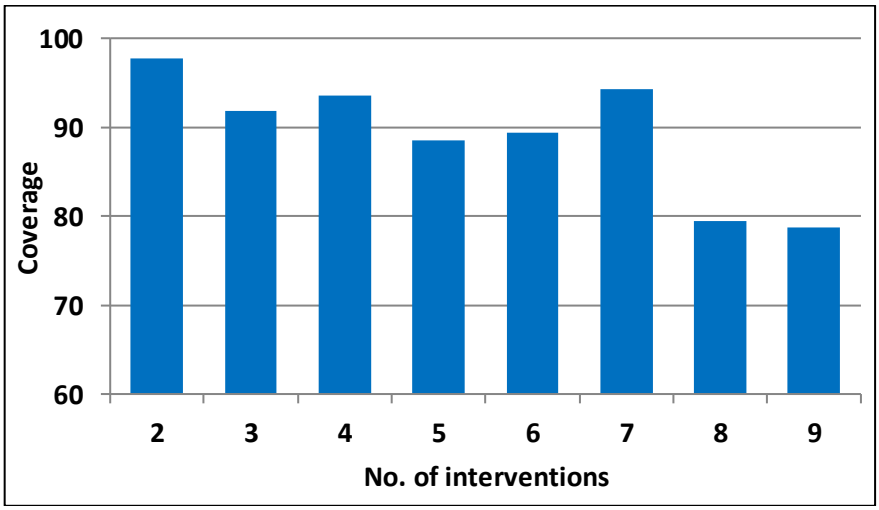
There has also been a steady and high coverage of measles vaccines when co-delivered in ICHEs through measles SIAs and CHDs during 2005–2010. Out of 142 events that co-delivered measles vaccine, 55% (79 cases) had measles coverage data reported in the ICHE database. Coverage data for measles derived from measles SIAs showed that the majority (79%) of coverage outcomes were greater than 90%. The

overall median coverage for measles was 96%, and mean of 91%. For measles coverage and the number of interventions, Spearman's rho showed a somewhat higher correlation (-0.22) but weak negative association, and it was not significant at a 5% level. (p=0.06) (Table 13)

Table 13 Spearman's rank correlation coefficient results: Measles coverage, number of interventions

Spearman's rho = -0.2162
p-value = 0.0557
Dependent variable: measles coverage
Independent variable: number of interventions

Figure 20 shows that eight or nine interventions appear to show a slight decrease in coverage, but the lower coverage can only be explained by more detailed studies in particular countries, taking into account the health systems and the broader context as to why the coverage was lower in those particular events.



(n= 79)

Figure 20 Median measles coverage by number of interventions, 2005–2010

3.6.7 Coverage outcome: Packages of interventions and association with vitamin A coverage

The relationship of the various packages of co-delivered interventions and VA coverage was also examined. The top 10 most common package combinations delivered during ICHEs between 2005–2010 and the median coverage of VA was

calculated per package type (Table 14). A non-parametric Kruskal-Wallis test was used to compare the median coverages of VA across the different packages of interventions. The test showed no association at 5% significance level in VA coverage across the different packages of interventions (p=0.07) (Table 15). The packages of interventions were not associated with VA coverage.

Though the package of VA – other antigen – growth monitoring ('vag') appears to result in low VA coverages, by looking at Table 14, out of 16 events that delivered 'vag', there were five out of 12 events with relatively low VA coverages (between 6–49%) found in the dataset which pulled down the median of that package group. Here again, the lower coverage can only be explained by examining each country context as to why the coverage was lower in those particular events.

Table 14 Frequency, means and medians of top 10 packages of interventions

Ranking	Package	Frequency	Mean coverage (vitamin A, %)	Median coverage (vitamin A, %)
1	vo	61	86	93
2	vod	51	92	93
3	vd	40	86	92
4	vmd	16	86	89
5	vad	15	80	83
6	vom	15	90	93
7	va	13	84	93
8	vm	13	92	83
9	vag	12	67	94
10	vdb	12	95	92

Table 15 Kruskal-Wallis test results: vitamin A, packages of interventions

N	238
Median	93
Chi-square	15.7
df	9
p-value	0.074

3.7 Discussion

This study has provided for the first time a global picture of the magnitude of the existence of ICHEs, and found that ICHEs appear to represent an effective platform with the capacity to incorporate high number of interventions without compromising coverage of key interventions. However, it could also be the case that a high volume of interventions could affect coverage of certain interventions beyond VA and measles, and can indeed affect other issues such as quality of services[133] and overstraining of limited human resources.[42,119] VAS and measles may fare better in multi-component integrated campaigns than, for instance, behaviour change promotion and HIV/AIDS prevention, especially as VAS and vaccination require less time and little variability in their delivery processes.[42,160] A study showed that it takes on average two minutes to deliver VA or infant vaccination, but over seven minutes for breastfeeding promotion and HIV counselling.[161] It is also often not very clear how effectively these behaviour change-related interventions reach and change behaviours of the target population promoted through these events, and often these interventions are not reported in national campaign coverage data even if they are delivered.[133]

While the findings in this study appear positive in relation to what can be achieved even in countries with under-resourced health systems, caution is needed in translating these to policy. The successes of delivering multiple interventions may not be replicated in some settings. An aggregate analysis does not provide information of the various implementation modes or the differing country context of each country where the events were conducted. Thus, it is difficult to suggest that adding interventions will not have detrimental effects for the health system, such as affecting the delivery of routine primary health care (PHC), as shown in some cases with routine immunization.[119,162]

There were some limitations in this analysis. First, the study analysed coverage outcome only for VA and measles vaccination due to the lack of coverage data for other interventions frequently included in the campaigns. Extending the analysis to other interventions' coverage, may have supported a more robust analysis of the

association between the number and nature of interventions and coverage levels that has been reported. Second, though there were more integrated measles SIA events that actually occurred,[163,164] additional measles SIA and VAS coverage data points were not to be incorporated into the UNICEF CHD dataset, as coverage indicators especially of VA and vaccination need to be examined by UNICEF and WHO first to assure quality[12]. As this analysis was based solely on the original UNICEF CHD database, the small sample size for the measles vaccine-related analysis was a limitation. However, it is important to note there was a consistency in high coverages obtained for both measles vaccines and VA throughout the campaigns, regardless of the sample size. Third, given the global nature of the analysis, contextual and other confounding factors could not be accounted or controlled for when analysing the association of coverage levels across numbers and packages of interventions. Understanding the nature and role of these country-specific factors may have improved the validity of results, helped to understand better strategy impact across sites.[165]

3.8 Conclusions

ICHEs appear to represent an effective platform with the capacity to incorporate multiple interventions without compromising coverage of key interventions. More research is needed on the contextual factors that are required to better understand what supportive factors need to be in place to facilitate these events.

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SECTION A – Student Details

Student	Mahoko Kamatsuchi
Principal Supervisor	Dina Balabanova
Thesis Title	Learning from Implementation of Integrated Child Health Events: Lessons from Global Practice and the Experience of Zambia

If the Research Paper has previously been published please complete Section B, if not please move to Section C

SECTION B – Paper already published

Where was the work published?			
When was the work published?			
If the work was published prior to registration for your research degree, give a brief rationale for its inclusion			
Have you retained the copyright for the work?*	Choose an item.	Was the work subject to academic peer review?	Choose an item.

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SECTION C – Prepared for publication, but not yet published

Where is the work intended to be published?	Bulletin of the World Health Organization
Please list the paper's authors in the intended authorship order:	Mahoko Kamatsuchi, Mike Mwanza, Wilbroad Mutale, Dina Balabanova
Stage of publication	**Not yet submitted**

SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	MK collected and analysed data. MM organised data collection in field. MK DB wrote the manuscript. MK DB MM WM read, revised and approved the final manuscript.

Student Signature: _____ **Date:** 27 May 2016

Supervisor Signature: _____ **Date:** 27 May 2016

Chapter 4 - Paper 2: Evolution of Child Health Week in Zambia (1999–2014)

4.1 Abstract

Background

To reduce child mortality in low- and middle-income countries (LMICs), there has been an increase in integrated child health events (ICHEs) to deliver essential health interventions in response to deficiencies in health systems in these countries. Countries implementing ICHEs deliver on average four interventions per event, and even when 10 interventions have been delivered within one campaign, high vitamin A (VA) coverages have been sustained. Zambia is unique, with one of the longest histories in conducting Child Health Week (CHWk) (a type of ICHE which includes measles supplementary immunization activity (SIA)), and including much larger numbers of interventions than in other countries. This paper analyses the evolutionary account of a CHWk-based strategy in Zambia, including changes to implementation and adaptation approaches over time.

Objective

To identify the key contextual socioeconomic and policy development factors which affected Zambia between 1999-2014 and led to an expansion of the country's ICHE strategy.

Methods

Qualitative research was conducted using the components of the implementation research framework as units of analysis. Semi-structured interviews were conducted with national and district stakeholders, together with an extensive document review of country reports as well as published and grey literature. Data was analysed using NVivo 10.

Findings

The evolutionary history of CHWk in Zambia demonstrates that the country was able to successfully integrate several additional interventions into its CHWk over a 15-year

period while maintaining high levels of coverage. Starting in 1999, Zambia integrated progressively more interventions into its CHWk and achieved dramatically improved campaign coverage outcomes in VAS. The number of interventions per event fluctuated significantly during this period, increasing from five to 10, and then back down to two, over a 15-year period (1999 to 2014). These fluctuations represent adaptations to the CHWk strategy over time based on changes in the context resulting from a range of factors, including disease outbreak, decentralization and donor support. Despite these fluctuations and challenges, CHWk continued to expand and attained high coverage (i.e. VAS and measles), serving as an assured and stable means to provide comprehensive services to the communities.

Conclusions

The Zambian experience with CHWk demonstrates the effectiveness of an ICHE-based strategy which progressively adds multiple interventions while maintaining or increasing coverage outcomes. It also demonstrates the potential vulnerabilities of such a strategy, with high levels of sensitivity to changes in context resulting in drastic fluctuations in the number of interventions per event. Further research is needed to assess the factors facilitating or limiting its success under different circumstances.

4.2 Introduction

To accelerate progress towards child mortality reduction beyond Millennium Development Goal 4 (MDG 4) – to reduce child mortality rates by two-thirds, between 1990 and 2015[166] – mass distribution of cost-effective child health and nutrition interventions through ICHEs have evolved since 1999 to become standard practice, and remain widely used.[1,3,42,53,74,75,77,78,93] In this study, *integrated health services* refers to a range of services delivered to a catchment population at one location and under one overall manager, conducted, for example, through multi-purpose outreach visits.[4] A key feature of this form of integration, from the community's perspective, is the opportunity to receive coordinated care, rather than having to make separate visits for separate interventions.[4] ICHEs, such as Child Health Days (CHDs), measles supplementary immunization activities (SIAs) and polio national immunization days (NIDs), are campaign-style events that often utilize wide-scale health and nutrition outreach platforms to deliver two or more maternal and child health and nutrition services. The main terminology differences between ICHE and CHD are that the latter is a type of ICHE and are conducted twice a year, usually at six-month time intervals, while the former is more inclusive and include any campaign that are given at any frequency and at any time of the year. Currently, there is a trend towards increased numbers of interventions delivered through ICHEs in LMICs.[1,54,106]

Zambia has developed and evolved Child Health Week (CHWk) (generically termed 'Child Health Day' (**Error! Reference source not found.**)) to deliver multiple life-saving h ealth interventions through this week-long service delivery strategy. This paper portrays the development of Zambia's CHWk (which is used in this study to refer to both CHWk and measles SIA, to simplify terminology), which has gradually added interventions to deliver through the events throughout its history of implementation. Originally starting with the polio NIDs in 1997 when vitamin A (VA) was co-delivered in the campaign, CHWk officially started in 1999 with five interventions, culminating in 10 interventions in 2010 through a measles SIA campaign, and then coming down to two interventions in 2013.

Other LMICs which have difficulty in reaching child health intervention coverage targets and seek to achieve similarly large advances in coverage may benefit by understanding how CHWk has evolved in Zambia and what broader contextual factors have shaped the expansion of the strategy. In contrast to other case studies and appraisals focusing on one point in time, this study covers 12 years of implementation history through a case study of the country of Zambia, and provides a depiction of the evolution of an ICHE strategy from a historical perspective. Zambia is a prime example of a former low-middle income country in sub-Saharan Africa that has achieved considerable success in delivering multiple number and types of interventions through CHWk which has eventually delivered one of the highest number of interventions globally. Zambia is taken as a case study as it has gradually developed their ICHE strategy (Child Health Week and measles SIAs) and successfully added on interventions throughout the 12-year time-span of the study. This paper attempts to portray the key contextual aspects that affected Zambia which led them to successfully expand CHWk strategy. Policy recommendations to policymakers of other LMICs attempting to expand their ICHE strategy are provided in the final Recommendation section in the final Discussion chapter (7.2.)

4.3 Objective

To identify the key contextual socioeconomic and policy development factors which affected Zambia between 1999-2014 and led to an expansion of the country's ICHE strategy.

4.4 Methodology

The study was underpinned by an implementation research framework (Figure 1) where the 11 components of the framework served as units of analysis and examined CHWk that took place in the period 1999–2014. Primary data was collected from semi-structured interviews with national and district stakeholders in Zambia, face-to-face and by telephone. Thirteen out of 17 respondents were based in Lusaka, while four were from two other districts. Six interviewees have been heavily involved in CHWk activities for over 10 years, and eight for 5–10 years. Ten were government staff, while seven were working for development partners. Informed consent was

obtained from all interviewees and results are reported in an anonymous manner. Data from this paper are derived from secondary data collected from an extensive search of policy documents, country reports, published studies and grey literature and semi-structured interviews. NVivo 10 was used to organize, code, and analyse the transcribed data from interviews and from other data sources. The conceptual framework and methodology is described in more detail in Chapter 2.

4.5 The Zambia Case

Zambia is a vast country, divided into 10 provinces with 89 districts,[167] with approximately half (46%) of the 15 million inhabitants below the age of 15.[168] Of the Zambian population, 58% are subsistence farmers, but the country is also fairly urbanized, with 42% of the population being classified as urban dwellers.[168] Despite a decade of rapid economic growth, the country is currently categorized as lower middle-income country (as of 2014)[169] and 60% of the population still lives on less than US$2 a day (2010) while 42% are considered to be in extreme poverty, subsisting on US$1.25 a day.[169] Moreover, the absolute number of poor people has increased from about 6 million in 1991 to 7.9 million in 2010, primarily due to population growth.[170] Almost 90% of Zambians living below the extreme poverty line are found in rural areas, and the poverty gap ratio is far higher among the rural population than their urban counterparts (20% and 3.7%, respectively).[170] The rural and remote parts of the country are characterized by long distances to health facilities, lack of transport and geographical barriers obstructing access to health facilities.

As fundamental problems within the health system hampered the effective delivery of health services, partly due to the Structural Adjustment Programme introduced in Zambia the 1980s and 1990s,[171,172] a wide-scale, population-based campaign strategy

proved to be a cost-effective and appealing approach to use within the context of the country's health system.[121,125,173] Despite slight improvements in health service delivery, the overall child mortality status in the late 2000s had stagnated, the communicable disease burden continued to increase, and child malnutrition remained high. Zambia had one of the highest prevalence of stunted children (58%, 2000)[174] within sub-Saharan Africa (43%, 2000).[175] Vitamin A deficiency (VAD) in Zambia was first recognized as a public health problem by the National Food and Nutrition Commission (NFNC) and Tropical Disease Research Centre (TDRC) in 1985, where they found almost 2% prevalence of xerophthalmia (clinical VA deficiency) while over 16% had biochemical levels of severe deficiency (<10 ug/dl)[176] in the Luapula Valley. Results from a nationwide baseline survey[177] reported 66% of children under 5 years old with low or deficient serum retinol levels (<20 ug/dl), with 6% of children manifesting clinical deficiency (night blindness).

As essential child survival services delivered within health facilities were not effectively reaching children, Zambia resorted to population-oriented outreach services seeking to expand access. Thus, CHWk and SIAs became opportune strategies to deliver essential health care services and uphold equitable access for all. As in many LMICs, there was an overwhelming lack of human resources for health (HRH) which was further worsened by high attrition rates,[178,179] along with a significant lack of primary health care (PHC) facilities required to cover the country.[179] Studies have shown that the HRH number in Zambia was low, particularly when comparing to other countries in the developing world,[178,180,181] revealing that Zambia has 1.05 health workers for every 1,000 people, which is less than Benin (1.11), Rwanda (1.22), Ghana (1.93) and India (1.95).[178]

The government that came to power in 2011 placed a strong focus on improving social services, especially for the rural population,[182] and allocated the bulk of health care spending to salaries, drugs and supplies.[182] However, Zambia's health expenditure has not yet met the Abuja Declaration pledge of allocating at least 15% of the annual budget to improve the health sector in 2011[183] (Figure 21). Comparing

with neighbouring countries, Zambia allocated approximately a smaller share of their GDP on health (5%, in 2013), while Uganda allocated 9.8%, Malawi 8.3%, Tanzania 7.3% and Mozambique 6.8% in 2013 (Table 15).[184]

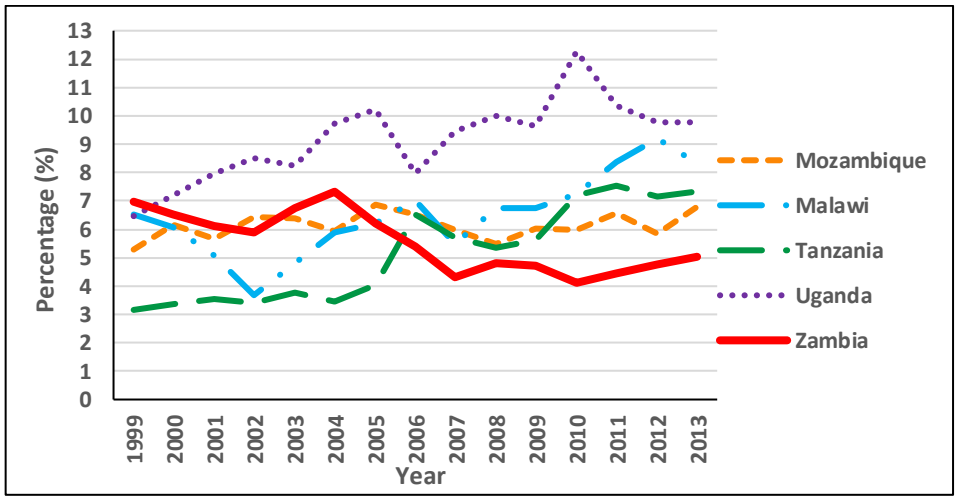

Figure 21 Health expenditure of selected sub-Saharan African countries (1999–2013)
(Source: World Bank, 2015)

Table 16 Health expenditure as percentage of GDP (2013)

	%
Uganda	9.8
Malawi	8.3
Tanzania	7.3
Mozambique	6.8
Zambia	5.0

(Source: World Bank, 2013)

Zambia has made significant progress in meeting health-related targets, namely MDG 4,[15](Figure 22),[185,186] and ranking high among one of the fastest growing economics in Africa[185], but there were no significant reductions in neonatal mortality rates which comprise a third of all under-five deaths. Zambia still ranks 21 out of 194 countries with the highest under-five mortality rate (U5MR) globally (2015),[187] and has experienced major disease outbreaks, with over 18,000 cases of measles recorded countrywide in 2011 and a case fatality rate (CFR) of 0.2%.[188] Efforts to further reduce U5MR and the infant mortality rate to attain the SDG 3.2 (to reduce under-5 mortality to at least 25 per 1,000 live births),[21] by providing life-saving services such as

childhood immunization, VA supplements, deworming tablets, and promoting life-saving practices, are still urgently needed.

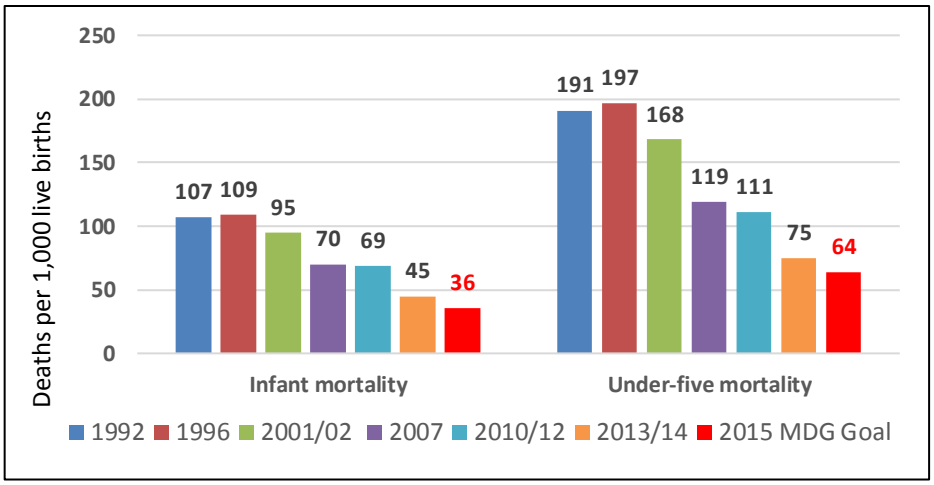

Figure 22 Trends in childhood morality, Zambia (1992–2013)

(Source: Zambia Demographic Health Surveys 1992, 1996, 2001-02, 2007, 2013–14; State of the World's Children, 2015)

4.6 Findings

The findings focusing on the development of CHWk in Zambia are presented via major themes that came about from analysing the components based on the implementation conceptual framework. The main themes found were the initiation of CHWk, increase in the number of interventions, measles SIA, and the evolution of the coordination and management of CHWk.

4.6.1 Context and history of Child Health Week

Zambia has a marked tradition of conducting ICHEs, called 'Child Health Week'. CHWk has been a major strategy to combat child mortality, in addition to routine delivery of services and other disease-driven, targeted approaches.[189,190] Throughout its 15-year trajectory, CHWk strategy has evolved through a series of adjustments made in the strategy design, implemented by the government of Zambia with support from multiple development partners. Zambia has experience in delivering high numbers of interventions during one child health event more frequently than other countries globally (20 times between 1999 and 2014)[14] (Table 17). The country has delivered an extremely high number (10) of individual child health interventions in one single measles-focused event in 2010,[14] during which vitamin A supplementation

(VAS) coverage reached 92% of the target population (children 6–59 months old)[83] while measles reached 86%. CHWk has varied over time, delivering between two and 10 interventions throughout the time span of 15 years, 1999 to 2014.

Table 17 Frequency of interventions during an ICHE (2005–2010), across countries delivering more than five interventions[14]

Countries that delivered five or more (5+) interventions	No. of events
Zambia	12
Uganda	10
Ethiopia	9
Nigeria, Philippines	8
Ghana	7
Burkina Faso, Sierra Leone	6
Burundi, Madagascar, Rwanda	5

Considering that VA deficiency has been a public health problem in Zambia since the 1960s,[61,177] CHWk evolved into a cost-effective mechanism[121,125] to deliver life-saving VA capsules to children throughout the country.

Multi-country studies on micronutrient supplementation have shown that campaign-based interventions (e.g. VAS supplementation during immunization days) are more successful in achieving coverage objectives than facility-based models.[191] Indeed, VAS coverage increased from 28% in 1997, when VA capsules were delivered through routine services in Zambia, to 75% when delivered through CHWk in 1999, and then 80% in 2002 and 92% in 2010,[145] as the country progressively shifted towards the CHWk campaign-style delivery strategy (Figure 23). The shift was due to the success of these campaigns in reaching high coverage, delivering VA through polio NIDs in 1997, and the stand-alone VA campaign conducted in 1998 (Table 18). Not only did this campaign-style model facilitate the delivery of VA to over 95% of all children aged 6 months to 5 years in Zambia,[154] but it has also been proven in other settings to be an effective vehicle to deliver other child health interventions.[69,70,72,73,82,192] Key delivery strategies used during CHWk are shown in Appendix 14.

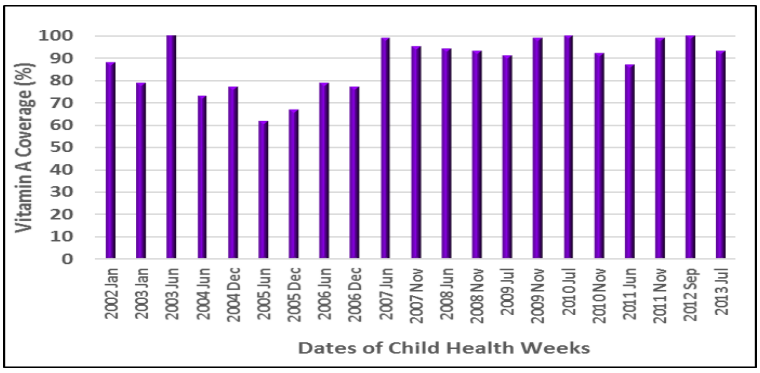

Figure 23 VA supplementation coverage by year during CHWk (2002–2013)

Table 18 Child Health Week evolution, composition and results, Zambia (1997–2014)

Year	Month	No. interventions	Vit A administrative coverage (%)/per round	Vit A annual coverage (%) (UNICEF)*	Measles coverage (%)	Delivery mode	Vitamin A	Catch-up Vaccination**	Polio***	Measles	Tetanus	Deworming	ITN***	Growth monitoring	WASH*****	BCC	Nutritional screening	HIV testing/ Family planning	IMCI
1997		1	28			Routine	✓												
1997		2				Polio NIDs	✓		✓										
1998	Jul	1				Nationwide outreach	✓												
1999	Aug	5	75	75		Child Survival Week	✓	✓				✓		✓		✓			
2001		5	83	83		Child Health Week (CHWk)	✓	✓				✓		✓		✓			
2002		7	88	80		CHWk	✓	✓	✓			✓	✓	✓		✓			
2003	Jan	6	79	73		CHWk	✓	✓				✓	✓	✓		✓			
2003	Jun	6	108			CHWk	✓	✓				✓	✓	✓		✓			
2004	Jun	6	73	50		CHWk	✓	✓				✓	✓	✓		✓			
2004	Dec	6	77			CHWk	✓	✓				✓	✓	✓		✓			
2005	June	6	62	66	--	CHWk	✓	✓	✓			✓		✓		✓			
2005	Dec	7	67		--	CHWk	✓	✓	✓		✓	✓		✓		✓			
2006	June	6	79		--	CHWk	✓	✓	✓			✓		✓		✓			
2006	Dec	6	77		--	CHWk	✓	✓	✓			✓		✓		✓			
2007	June	7	99	95	100 (107)	Measles SIA	✓	✓	✓	✓		✓		✓	✓				
2007	Nov	7	95		--	CHWk	✓	✓	✓			✓		✓	✓	✓			
2008	June	7	94	96	--	CHWk	✓	✓	✓			✓		✓	✓		✓		

Year	Month	No. interventions	Vit A administrative coverage	Vit A annual coverage (%)	Measles coverage (%)	Delivery mode	Vitamin A	Catch-up Vaccination**	Polio***	Measles	Tetanus	Deworming	ITN***	Growth monitoring	WASH*****	BCC	Nutritional screening	HIV testing/ Family	IMCI
2008	Nov-Dec	8	93		--	CHWk	✓	✓	✓			✓		✓	✓		✓		✓
2009	July	8	91	91	--	CHWk	✓	✓	✓			✓	✓		✓	✓	✓	✓ HIV	
2009	Nov	8	99		--	CHWk	✓	✓	✓			✓	✓		✓		✓	✓ FP	
2010	July	10	100 (106)	92	86	Measles SIA	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		
2010	Nov	7	92			CHWk	✓	✓	✓			✓		✓		✓	✓		
2011	Jun	6	87	72		CHWk	✓	✓	✓			✓		✓		✓			
2011	Nov	6	99			CHWk	✓	✓	✓			✓		✓		✓			
2012	Sept	6	100 (122)		96 (<15 yrs)	Measles SIA	✓	✓	✓	✓		✓					✓		
2013	July	2	93	93		CHWk	✓					✓							
2013	Nov	2				CHWk	✓					✓							
2014	Jun	2				CHWk	✓					✓							

(Source: Personal interviews, May 2014; Mwanza, 2001–2005,2009; UNICEF Zambia reports 2005–2013; UNICEF CHD database, 2010b)

*Percentage of children ages 6–59 months who received at least 2 doses of Vitamin A. Source: UNICEF, State of the World's Children.

**Catch-up vaccination usually consisted of BCG, DPT-HepB-Hib, Measles, OPV (oral polio vaccine) to provide children who have missed their jabs on their individual schedules. Originally aiming to catch up with the 20% of children missed their opportunities.

***Oral polio vaccine usually covered 30 districts including those bordering Angola, DR Congo, and Lusaka and Ndola for children under five years.

****ITNs – Retreating of existing insecticide-treated nets. Actual distribution of new ITNs through CHWk in 2009. Distribution of new ITNs was managed separately through the Malaria program via separate distribution campaigns and delivery mechanisms.

*****WASH: Water, sanitation & hygiene interventions. Soap distribution conducted in 2007.

4.6.2 Strategy design: Increase in numbers of interventions

There was a gradual increase in the number of interventions delivered every couple of years, as CHWk was viewed as a viable delivery mechanism to reach vast numbers of children. In 1997, Zambia piloted the delivery of two interventions (VA and OPV). Six months later, however, VA only was distributed as a stand-alone campaign in 1998,[193] as USAID provided financial and technical support to conduct this follow-up project to initiate the distribution of VA outside the polio NIDs. During the primary years of the start-up, Child Health Week was mostly funded by donors *'that were pumping in a lot of money',* noted a project manager with over 10 years' involvement working on CHWk. In 1999, the first non-NIDs VA supplementation strategy, termed 'Child Survival Week', was launched in August; the name was later changed to 'Child Health Week'. (Appendix 15)

The package of interventions continued to grow over time. Originally consisting of five interventions in 1999, the number of interventions increased to six and seven between 2002–2006 (Table 18). In addition to VAS, other essential health services were delivered, such as: catch-up vaccination, deworming tablets, growth monitoring (GM) and behaviour change communication (BCC) of key family practices. Catch-up vaccination was included *'to reduce the politics of just delivering vitamin A […] and to catch those children who missed the opportunity to obtain their vaccination'*, as commented by an expert on CHWk. Radio and TV messages, announcements, and talk shows promoting key healthy practices for BCC took place every year as the CHWk strategy evolved. Tetanus-toxoid vaccine was added in 2005, while measles became a focus in 2007 during the measles SIA. Water, sanitation and hygiene (WASH) interventions were included in 2007, while tetanus and measles were not delivered. In 2009, early infant diagnosis (EID) of HIV was included, totalling eight interventions; in the second round in 2009, family planning was added and EID was removed (Table 18). Multiple multi-lateral development partners, bilateral donors

and NGOs[**] joined in the collaboration and provided funding and technical assistance to CHWk, including planning, procurement of supplies, logistical support, monitoring and evaluation.[194,195]

4.6.3 Measles campaign as Child Health Week

The integrated child health campaign strategy culminated in the measles campaign that delivered 10 interventions in 2010. Measles supplementation immunization activities (SIAs) were instrumental in reinvigorating the scaling up of essential services through campaigns in Zambia. Despite the original reluctance to add more than five interventions, a non-immunization specialist noted that: '*If it's measles it's okay because it comes with money, because it's a global push*.' When a measles SIA was conducted in 2007, VA campaign coverage increased from 77% in 2006 to 100% in 2007 (Figure 23) and coverage was near universal: 91% of districts had over 95% administrative coverage of measles.[196] Due to a measles outbreak that affected over 18,000 children and adults, and resulted in approximately 240 deaths, in 2010–2011,[††196,197] the Ministry of Health (MOH) changed the emphasis of its originally VA-centred CHWk to focus particularly on measles in July 2010 and September 2012, targeting children aged between 9–47 months[198] and 9 months and 15 years respectively[199] (Appendix 16). Regardless of the measles-focused campaign, numerous interventions continued to be delivered as part of measles SIA, with the number of interventions increasing to 10 in 2010. In addition to the basic package of interventions of VA, deworming, catch-up vaccination, OPV, GM and BCC, additional interventions delivered were measles, tetanus-toxoid, WASH and nutritional screening.

[**] Key partners involved in CHWk were: UNICEF, WHO, USAID projects (i.e., Zambia Integrated Systems Strengthening programme (ZISSP, former HSSP), CIDA/DFATD, Centre for Infectious Disease Research in Zambia (CIDRZ)), World Vision, National Malaria Control Center (under MOH), DFID, JICA, CARE International, GlaxoSmithKline (GSK), and Centers for Disease Control (CDC) and numerous others.

[††] According to WHO, the factors that contributed to the measles outbreak in Zambia were thought to be due to: i) an epidemiological shift to older age groups, ii) gaps in routine immunization (though Zambia's WHO/UNICEF official measles coverage was 90% (2009), 96% (2010) and 83% (2011)), and iii) longer inter-campaign intervals. WHO-AFRO (Masresha B., Measles outbreak in Southern Africa WHO, 2011).

From 2011, the number of interventions began to decrease, eventually falling to six interventions. The package of interventions was slightly reduced in comparison to the measles-focused campaign in 2010, and measles, tetanus-toxoid, WASH and nutritional screening were not delivered. The measles SIA campaign conducted in 2012 delivered only six interventions, this time adding nutritional screening. It is not clear whether GM and BCC were ongoing interventions post-2012 but they were not reported to be delivered in UNICEF's CHD database[83] or in the country's SIA or CHWk reports.[200,201] Campaign results of the 2012 integrated measles-focused campaign in Zambia showed that 7.5 million children aged 6 months to 15 years were vaccinated against measles, with a post-campaign cross-sectional survey coverage of 96%.[202] Regardless of the numbers of interventions, it was apparent that measles and VA coverage remained high and stable (Table 18, Figure 21).

In 2013, the government abruptly decided to reduce the type and number of interventions to be delivered through CHWk to only two, focusing only on nutritional interventions, i.e. VAS and deworming (Table 18). The possible reasons for this decrease in number of interventions are explored in Paper 4 (Chapter 6).

4.6.4 Evolution of management of Child Health Week

Management and coordination of CHWk in Zambia evolved throughout its 15-year-old practice, determined by the focus intervention of the event and the health sector management structure. From 1999, CHWk in Zambia was originally managed by the National Food and Nutrition Commission (NFNC), as CHWk was mainly a VA-delivery focused campaign. As CHWk began to incorporate the delivery of additional health interventions, it was later transferred to the overarching Child Health Unit (CHU) within the MOH in 2002, with fundraising, fund disbursement, monitoring, and training planned and coordinated at the national level.[121,125,133]

To achieve their goal of providing cost-effective quality health services as close to the family as possible,[27,28] and to ensure equity of access in health service delivery, the government decentralized its health services under a health sector reform

programme in the early 1990s.[179] The decentralization policy was adopted in 2002 and subsequently launched by the president in August 2004.[203] CHWk was managed at the national level until 2005, but when decentralization was introduced, CHWk became management responsibility of the districts.

Decentralized management of CHWk halted the momentum of the strategy. While the reasons for the abrupt decrease in VA coverage from 100% in the latter half of 2003 to the 60th percentile in 2005 are unclear, it was suggested that both the cessation of funding from major donors and the initiation of the administrative decentralization contributed to the poorer performance. As a part of the decentralization process, the districts stopped receiving national-level funding (allocated for CHWk since 2005), and a budget line for CHWk was then included in the annual district plans. District operational grants from the government were allocated on a per capita basis, taking into account population density, price of fuel, likelihood of epidemics and the presence of a bank.[179] Within their allotted budgets, the districts were expected to plan, finance, manage and deliver PHC services to the population within their respective health catchment areas, including essential child health services delivered through CHWk. The potential effects of decentralized management of CHWk are analysed in another paper.[133] However, UNICEF still continues to provide substantial in-kind support, including mebendazole for deworming, whereas the Micronutrient Initiative/CIDA through UNICEF supply channels continues to provide VA capsules.[204]

Substantial donor funding for disease-specific interventions also enabled the continuation of ICHEs, with high numbers of interventions per campaign throughout the years. Donor financing accounted for a large proportion of total health expenditures (THEs) for health in Zambia in the early 2000s; in 2002–2004, about 38% of THE came from donors, 24% from government and 38% from the private sector.[179] In contrast, in 1995, external assistance only accounted for 11% of THE, and the government 38%, while the private sector accounted for 51% (Figure 23). For the

most part, donor contributions provided in-kind support, but also increasingly provided cash support.[179] The projection in 2009 was that Zambia's health sector was poised to become most donor-reliant in Africa, with the share of external resources to THE exceeding that of any country in the region in 2002–2004, with the exception of Mozambique and Rwanda.[179]

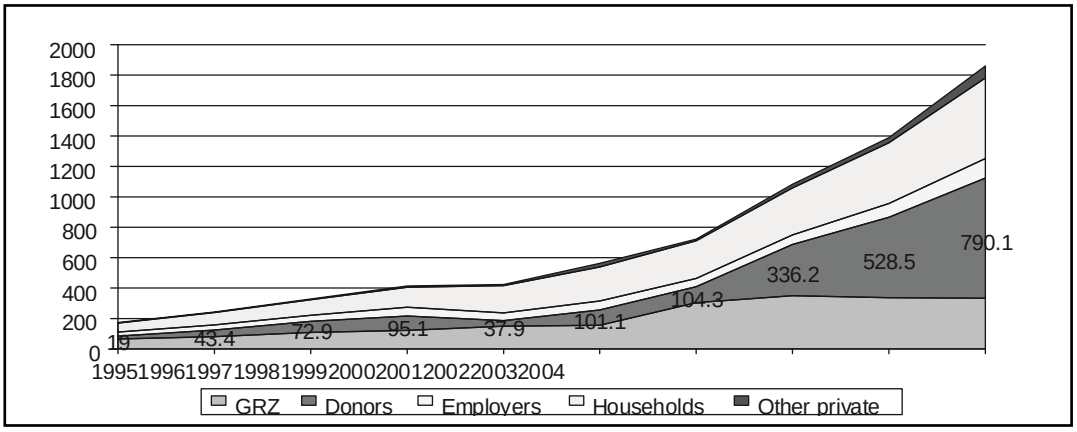

Figure 24 Trends and projection in health expenditures by source, 1995–2004
(ZMW Billion)
(Source: World Bank/Picazo, 2009)

However, the corruption case that developed in the Zambian MOH in 2009 caused donors to freeze their health aid and cancel general budget support.[205-207] Following concerns of mismanagement, the CHU faced significant hurdles in mobilizing funds from donors to maintain the continuity of CHWk. However, regardless of the donor aid withdrawal, some donors continued supporting CHWk by providing funds indirectly, through other organizations. Zambia also obtained US$2 million in 2010 for the measles SIA in particular, which also included oral polio vaccine (OPV) in selected districts,[208] and US$8 million was raised in 2012 for the measles SIA which delivered measles vaccine to children aged between 9 months and 14 years.[209] The commodity costs of other interventions such as VAS and deworming tablets, besides measles and polio vaccines, were paid for by the other projects individually, while the logistics, transportation, training, monitoring and supervision costs were covered through the measles campaign funding.[208]

With the incoming President of Zambia in 2011, a new Ministry of Community Development Mother and Child Health (MCDMCH) was formed in 2012, seeking to

realign maternal and child health (MCH) functions from the MOH to the MCDMCH. CHWk implemented at the district levels and below were then overseen by the MCDMCH, while the MOH only managed medical procurement and supply distribution logistics relating to CHWk. CHWk activities were included in the mid-term expenditure framework (MTEF) planning, where each ministry and department (as MCDMCH, MOH, NFNC) formulated action plans every three years (2012–2015), and these were adjusted annually. Under MCDMCH management, since 2013 there was a radical change in the way that CHWk was delivered, with the number of interventions being abruptly reduced to two, focusing mainly on VAS and deworming. ‡‡ The potential reasons behind the reduction in the number of interventions are explored later in the study (Paper 4).

4.7 Discussion

The largely positive experience of Zambia demonstrated that other LMICs may be able to progressively incorporate additional interventions within ICHEs successfully without compromising the levels of coverage. This is consistent with global research and the analysis shown in Paper 1 of this study. The Zambian case also illustrated that campaign-based approach can potentially lead to dramatic increases in coverage outcomes in key services that are delivered via these events.

However, the evolution of the Zambian experience with the CHWk strategy also demonstrated how sensitive this approach can be to changes in context, as manifested by the remarkable fluctuations in the number and type of interventions due to the particular contextual events in any given year. This analysis showed that ICHE-based strategies can be quite susceptible to unexpected and unpredictable changes or events, including those which may be beyond the control of the ministries of health. In the Zambian case, important contextual changes affecting the number and type of interventions delivered through CHWk included rapid changes in donor

‡‡ The Child Health Unit was fully integrated back to the MOH from MCDMCH in January 2016. The pronouncement was made in January 2015 after the new president came in power.

funding flows and policy directions, new decentralization management structure, specific disease outbreaks, emerging management challenges, structural shifts in ministerial responsibilities, and overall changes in national health policy. It can be argued that in some ways, the CHWk strategy proved resilient and responsive to these challenges, for example, adapting successfully to respond to the measles outbreak in 2007. It may be, however, less resilient to other types of contextual changes, such as the level and nature of donor funding whereby the ability of national and district level actors to modify policy direction is relatively constrained. Given the erratic history of donor funding flows to LMICs and their tendency to fluctuate dramatically over time, often based on policies or politics within the aid recipient countries or on other externally-driven events or contextual factors,[210,211] this may be a vulnerability of an ICHE-focused delivery strategy. Careful assessment and calibration of both local and international contexts is an important part of the decision-making process for countries and other officials seeking to replicate an ICHE-focused strategy based on the Zambian experience.

4.8 Conclusions

In Zambia, progressively adding multiple interventions to CHWk over a 15-year period resulted in maintaining or increased coverage in key areas, demonstrating the success of a multiple intervention ICHE-based strategy. However, dramatic fluctuations in the number and type of interventions due to constantly changing environment, balance of political power and management structures, and dynamics of donor involvement raise questions about its stability over the longer term. Thus, the viability of campaign-style events depends on historical and broader governance factors, while at the same time their operation is shaped by new circumstances that are often unknown in advance.

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SECTION A – Student Details

Student	Mahoko Kamatsuchi
Principal Supervisor	Dina Balabanova
Thesis Title	Learning from Implementation of Integrated Child Health Events: Lessons from Global Practice and the Experience of Zambia

If the Research Paper has previously been published please complete Section B, if not please move to Section C

SECTION B – Paper already published

Where was the work published?			
When was the work published?			
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SECTION C – Prepared for publication, but not yet published

Where is the work intended to be published?	Global Health: Science and Practice
Please list the paper's authors in the intended authorship order:	Mahoko Kamatsuchi, Mike Mwanza, Sandra Mouniver-Jack, Wilbroad Mutale, Dina Balabanova
Stage of publication	**Not yet submitted**

SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	MK collected and analysed data. MM organised data collection in field. MK DB wrote the manuscript. MK DB SMJ MM WM read, revised and approved the manuscript.

Student Signature: _____ **Date:** 27 May 2016

Supervisor Signature: _____ **Date:** 27 May 2016

Chapter 5 - Paper 3: 15 years of Child Health Week in Zambia: factors influencing performance and challenges

5.1 Abstract

Background

In many low- and middle-income countries (LMICs), integrated child health events (ICHEs) are an established mechanism for delivering essential health interventions to achieve improved outcomes. Zambia's experience with CHWk, a form of ICHE, is distinct, with generally high numbers of interventions per event and positive coverage levels over a 15-year period. It is important to better understand the underlying factors which contributes to this successful experience, as well as the challenges and potential pitfalls, so that other LMICs seeking to achieve similar results can learn from the campaigns' successes while avoiding any potentially negative or undermining effects for their health systems.

Objectives

To identify the key factors that helped to facilitate the expansion of CHWk and reliance on it as a primary service delivery strategy for improving child health.

Methods

The study drew on implementation research framework to examine CHWks that took place in 1999–2014 in Zambia. Semi-structured interviews were conducted with national and district stakeholders together with an extensive search of country reports, as well as published and grey literature. Data analysis was conducted using NVivo 10.

Findings

Zambia's CHWk implementation was characterized by strong political commitment, collaborative action and coordination, and continuous social mobilization, which provided a solid base for expanding the strategy by gradually extending and enhancing CHWk, for example, delivering an increasingly multifaceted package of

interventions. This was despite the persisting challenges of inadequate district resources, perceived decrease in service quality and long waiting times to access services due to the multiple interventions being delivered simultaneously. Delivering 'catch-up immunization' during the bi-annual CHWk became the norm due to the lack of district resources to compensate for logistical difficulty in access, lack of facility personnel and funding to continue carrying out routine outreach visits. The combination of institutionalized yet donor-supported bi-annual CHWk and the lack of financial and human resources invested in district health management and health systems processes could potentially disrupt the adequate provision of routine immunization in the long-term.

Conclusions

The Zambian experience demonstrates that implementing multi-component campaigns is feasible through strong government stewardship, but is highly dependent on consistent resource allocation and support to districts and health facilities. However, strengthening campaigns can easily become the primary modality for delivery of essential services, with a corresponding 'lock-in'. A parallel investment in gradual strengthening of routine immunization systems is critically important in achieving and sustaining long-term child mortality gains.

5.2 Introduction

Reaching the Sustainable Development Goal (SDG) target 3.2 of ending preventable deaths of children under 5 years of age to as low as 25 per 1,000 live births by 2030,[21] requires taking further accelerated steps and revisiting the current paradigms on what works, why and how. Child health and nutrition services delivered through ICHEs have become a common health service delivery mechanism and remain widely used in many LMICs.[1,3,42,53,74,75,77,78,93]

Zambia's policy and practice of tackling child mortality has been closely associated with conducting ICHEs over long period of time,[189,190] which in this study include both Child Health Week (CHWk) (generically termed 'Child Health Day' (CHD) which is a type of ICHE) and measles supplementary immunization activities (SIAs). CHWk campaign-mode delivery strategy has been perceived and implemented as a major strategy to combat child mortality in Zambia, in addition to routine delivery of services and other disease-driven targeted approaches. CHWk was initiated by the National Food and Nutrition Commission (NFNC) of Zambia starting in 1999 along with numerous development partners[§§] which continued to support the campaign efforts. The government used CHWk to deliver VAS and other interventions due to the successful VAS coverage results obtained through polio national immunization days (NIDs) in 1997 and the stand-alone VA campaign in 1998 (Table 18). With the introduction of decentralization in Zambia, since 2005, the districts were made responsible to manage CHWk.

Zambia has a reputation for political stability, as it has avoided war and upheaval that has marked many of its neighbouring countries,[212] with six successful democratic elections since 1991.[213] Zambia's economy has also grown at an average annual rate

[§§]Key development partners which were involved in CHWk at one point were: UNICEF, WHO, USAID projects (i.e., Zambia Integrated Systems Strengthening programme (ZISSP, former HSSP), CIDA/DFATD, Centre for Infectious Disease Research in Zambia (CIDRZ)), World Vision, National Malaria Control Center (under MOH), DFID, JICA, CARE International, GlaxoSmithKline (GSK), and Centers for Disease Control (CDC) and numerous others.

of 7% between 2010 and 2014.[213] There was much foreign aid reliance in Zambia in the early 2000s, where official development aid (ODA)[***] was on average 19% of the gross national income (GNI) between 1999-2004[214] (Figure 25). Notably since 2007, there has been a downward trend of aid dependency in Zambia.

Throughout its 15-year account of conducting CHWk, the campaigns' design in Zambia has evolved, in response to the changing resources, political and managerial context, with a diverse package of services delivered each year. Zambia has extensive experience in adding on and delivering multiple interventions during a child health event with successful outcomes (i.e. high VA and measles campaign coverage). (Table 18) Moreover, in 2010, it delivered one of the highest number of individual child health interventions within a single measles-focused event (n=10).[14]

As Zambia has been receiving large external funding to support their national health agenda for numerous years, a key proposition is that the main reason why Zambia was able to expand the ICHE strategy is primarily due to the extensive and sustained donor funding support. However, it is unlikely that this is the only factor that comes into play to support the expansion of CHWk and the influence of government stewardship may have been important.

This study seeks to identify the conducive factors which enabled Zambia to successfully develop and co-deliver multiple interventions using the CHWk delivery platform while ensuring these had a wide reach and acceptability among the population. It does so by identifying and analysing key factors influencing CHWk performance in Zambia, and the opportunities and challenges of delivering multiple interventions throughout its 15-year practice of conducting CHWk.

[***] Net official development assistance (ODA) consists of disbursements of loans made on concessional terms (net of repayments of principal) and grants from members and non-members of the Development Assistance Committee (DAC) and multilateral institutions. (OECD, 2016. Ref. 204)

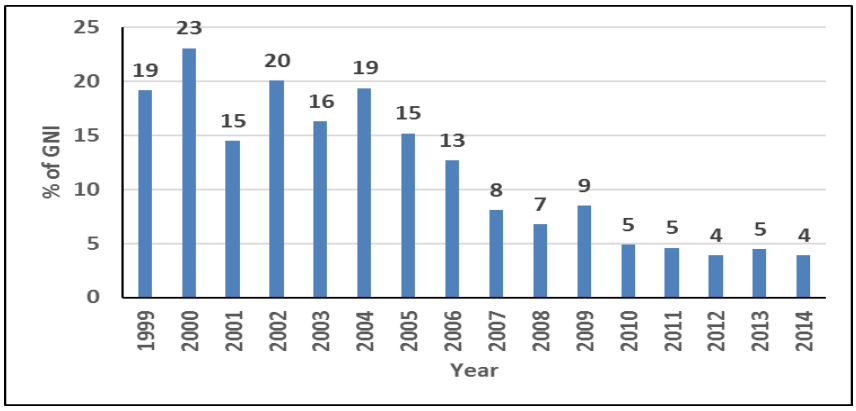

Figure 25 Percentage of official development aid of gross national income, Zambia (1999-2014)

(Source: OECD, 2016. Ref. 204. http://stats.oecd.org)

5.3 Objectives

To identify the key factors that helped to facilitate the expansion of Child Health Week and reliance on it as a primary service delivery strategy for improving child health.

5.4 Methodology

The study used an implementation research conceptual framework, which underpinned the data collection and data analysis, to identify major themes emerging from the findings. The main features of the framework consisted of 11 components (strategy design, management and monitoring, human resources, financial resources, communication, service delivery, supply, logistics, outcomes, constraints and the context), where each component addressed an aspect of the evolution of the different ICHE strategies throughout the years of the study. Data were obtained through semi-structured interviews, analysis of country reports, literature published in Zambian national and international journals, along with grey literature. Seventeen individuals were interviewed, out of which 13 were based in Lusaka while four were from two districts. Six respondents were involved in CHWk for over 10 years, and 13 for more than five years. Ten were government staff, while seven worked with development partners. Informed consent was obtained from interviewees and results were reported in an anonymous manner. NVivo 10 was used to organize, code and analyse the transcribed interview data and other data sources. The conceptual framework and methodology are available with more detail in Chapter 2. The

findings are presented by themes that came strongly from the analysis which were derived from the components of the conceptual framework and NVivo coding (Appendix 1).

5.5 Findings

5.5.1 Prominent features of Zambia's Child Health Weeks

Zambia has been able to deliver high number of interventions throughout many years due to a range of factors that emerged from the analysis.

5.5.1.1 Coordination, synergies, and partnerships

Collaborative and unified multi-sectoral coordination and the component of management was found to be a distinctive feature of the success of CHWk.[195,215-217] The Child Health Technical Committee (CHTC) and sub-committees held pragmatic bi-weekly meetings, where discussions took place on the package to be delivered that year, the additional health workers required, logistical issues, and other various elements that needed to be factored in to effectively plan and manage the campaigns. CHTC was composed of members from Ministry of Community Development Mother and Child Health (MCDMCH), the Ministry of Health (MOH) and NFNC personnel at the national level who worked in close collaboration with other government departments, international organizations, bilateral agencies and NGOs supporting the campaign financially and technically (Appendix 17 for an example list of partners).

This collaboration and joint working took many different forms. CHTC was divided into sub-committees of monitoring and evaluation, service delivery, logistics and supply, and social mobilization. It was commonly noted by many respondents that CHTC worked as a consolidated team, and the sub-committees strategized together on the various aspects of implementation of CHWk (R1, R7, R10, R13, R15, R16). A member of the CHTC noted that:

> *'When you go in, you go in as a single program. We go in consolidated, so we work as a team. We just have to make sure that each program ensures that all their logistics are in place.'*

The collaboration worked efficiently, as each health project staff member or donor contributed, drawing on their specific expertise within CHWk. When interventions were added, each project team would be responsible for the logistics and supplies for the particular component they were involved in. For example, immunization colleagues would be responsible for making sure the vaccines and immunization monitoring tools were available, while the nutrition group ordered the VA capsules which were supplied by UNICEF with funding from CIDA, and ensured they were delivered with the vaccines.

CHWk was a well-accepted and popular strategy that various government sectors, donors and civil society took part in, thus serving as an easily accessible mechanism to deliver numerous health services to children throughout the country. At the national level, the Child Health Unit (CHU) under the MOH (during 2002–2012 and later under the MCDMCH) was responsible for bringing all partners together, calculating the budget and seeking partners' financial, technical or logistical support. At the provincial level, similar processes were instituted, whereby provincial offices worked with the various departments, NGOs and the private sector to mobilize resources, transport, and other commodities to implement CHWk. Various contributions were made, such as fuel or vehicles by various divisions at the district level, or drinking water for CHWk teams by local businesses. CHWk had a high level of acceptance and perceived importance to the communities and the country as a whole, such that ministers of health and top officials from multilateral organizations took part in major launches of CHWk.[218]

5.5.1.2 Strong and consistent social mobilization

Effective and continuous communication and social mobilization provided a solid base for expanding CHWk in Zambia. Respondents indicated that there was a strong component of social mobilization throughout the years of implementing the campaigns, which helped to fundamentally embed the CHWk concept into Zambian society. As a result of continued communication, social mobilization and targeting messages to the communities through national and local mass media, community

networks, posters and banners throughout the years, it was commonly noted by respondents that the communities, mothers and caregivers expected CHWk to be held twice every year, so their children could receive the necessary health services (R3, R6, R7, R8, R16). A multilateral donor remarked:

> *'Child Health Week is currently established and institutionalised, as it has been held in Zambia for so long.'*

Mothers and caregivers would travel 5–30 km on foot or by local transport to reach the health posts with their babies to receive vaccinations, nutritional care and other basic services. Findings showed that trust was built over time and that CHWk became the 'social framework'[219] in which health interventions were delivered, and highly sought out by community members.

The strong social mobilization often manifested through the active functioning of the social mobilization (soc-mob) committee[†††] that met every two weeks for a few months prior to the campaigns. The soc-mob committee examined the interventions to be delivered in the respective year, and strategized on how best to communicate the CHWk days and the activities involved in these to the communities. Depending on the interventions to focus on in a campaign, the committees discussed issues such as: what messages motivate people, where and how people usually obtain information, and which communication channels work better than others. They explored how these communication approaches performed during the previous round, and planned their next social mobilization campaign to inform the country about the forthcoming CHWk event. The districts had their own formal social mobilization plan which engaged community leaders and networks.

Even if the number of interventions increased, the additional interventions were usually not the key focus of the messages, as these were not considered to be problematic. A critical aspect here was that the inclusion of additional interventions

[†††] The partners involved with the social mobilization committee at the time of the interview were: Ministry of Community Development, Mother and Child Health, Ministry of Health, NFNC, UNICEF, WHO, Care International, Malaria Control Initiative, Glaxo Smith Kline, Lions' Club, Jesus Christ Church of Latter Day Saints (May 2014).

was usually not an obstacle in ensuring that the communities accepted these interventions, given the high level of awareness among the population and the buy-in in relation to this service delivery model. Communication specialists concurred that CHWk had become very familiar to the population:

> *'As long as the announcement of the dates of the Child Health Week were notified to the communities, we have people coming forward without much persuasion.'* (National communication specialist)

The national soc-mob committee required less effort to target messages when it was a less complicated campaign with only five or six interventions. For these campaigns, they used mass media and interpersonal, face-to-face communication methods led by formal and non-formal community leaders to announce the dates of CHWk. When more complex or new interventions were introduced into CHWk, the soc-mob committee at the national level had significant involvement in planning the appropriate communication strategy including which messages should be sent and how. For example, to further increase awareness of EID services available during CHWk, dedicated posters and brochures were distributed and community sensitization was carefully performed in several key selected districts.

These campaigns were not just repeated, but adapted to the changing context. This occurred through reflection, modification and lesson-learning from between campaigns. For instance, including EID of HIV into CHWk was reported to have led to some difficulties because many community members were somewhat sceptical about testing their babies for HIV. After informing the communities of EID in the first round in 2009 and sensing that the number of people coming for CHWk services died down, it was later decided to omit EID in the CHWk package of interventions to avoid deterring community members from accessing other child health services during CHWk.

> *'Most of the people in the communities were still sceptical about having their babies tested for HIV […] After the campaign, the numbers of children just went down [in some of the districts]. Many people didn't come that year. So we stopped the broadcasting for infant HIV-testing in the following year during the measles campaign in 2010.'* (National communication specialist)

Another example was the promotion of male circumcision. A national health manager raised the issue of avoiding sending mixed messages through the campaigns:

> '*Imagine if male circumcision is added to the messages. There may be risks to how the community sees what health services are being delivered and to whom.'*

The number of interventions has not always been explicit in the campaigns. Despite the fact that the campaign messages may only mention one or two interventions, such as measles, or just VA and deworming, in practice more services were provided. A soc-mob committee member remarked:

> *'Vitamin A is the one that all other interventions ride on. But when it is a measles SIA campaign, vitamin A takes a back seat and we won't mention it.'*

Based on long-standing experience in engaging with communities and social mobilization for CHWk, a national-level communication specialist remarked that 'they don't need to load the communities with too much information. People would always attend the event, and they were happy to access more health services for their children.'

5.5.1.3 Strong government stewardship

Strong management in terms of political commitment and ownership of CHWk by the government were exemplified by its coordination of the various components of the CHWk events, and its dealing with problems and challenges as they arose. Whether deciding on a communication strategy or the interventions to be delivered, fundraising or determining the target population for certain interventions, the MOH (and later MCDMCH) has been in the driver's seat, and development partners provided technical and financial support to these institutions as required.

The supervisory visits conducted during the campaigns and feedback provided by the national-level staff involved in CHWk were perceived to be critical to obtain constructive and helpful insights for the CHTC to overcome challenges and to make adjustments and revisions for the next round of campaigns. For instance, several

supervisors noticed that supplies were not reaching certain districts in time for the campaign. This was highlighted to the CHTC who notified Medical Stores Limited[‡‡‡] to ensure that they could plan ahead of time to ensure timely delivery at the province and district levels. In addition to validation surveys, feedback from communities obtained from supervisory reports and exit interviews of caregivers who have used the services proved to be a vital source of information to make adjustments in the implementation of the subsequent CHWk events and to improve their reach and acceptability.

5.5.2 Deciding types and numbers of intervention

The decisions about which interventions to deliver through each CHWk in terms of the strategy design were usually made at the national level by the CHTC (See 5.5.1.1). There was no clear guideline on how the type and number of interventions were decided, but the CHTC brought their recommendations to the permanent secretary of the MOH (or MCDMCH since 2012), seeking endorsement of the intervention package. The decision to incorporate additional interventions through CHWk in addition to the minimum package of interventions (i.e. VA, deworming, catch-up vaccination, growth monitoring (GM), behaviour change communication (BCC)), was often based on the availability of financial resources to pay for extra human resources, logistics, supplies and, in some cases, after pilot-testing the feasibility of delivering the new intervention through CHWk:

> *'If you want to introduce a new service, you need to factor in one extra person. So bring in the money to increase the team. These discussions are always held at the national level.'* (National health specialist)

When a new project proposed to deliver an intervention through CHWk, it did so by bringing forth additional resources. For instance, when EID of HIV (in 2009) or the promotion of hand-washing with distribution of soap (in 2007) were proposed to be included, HIV/AIDS and water, sanitation and hygiene (WASH) projects brought in

[‡‡‡] Medical Stores Limited is a government agency responsible of ensuring the distribution of quality drugs and medical equipment at accessible prices, made available through approved government and non-government agencies in Zambia. (http://www.medstore.co.zm/index.php/about-us).

additional funding and supplies for their predetermined districts to roll-out their activities. A key member of the CHTC remarked, 'If they have money, they can come in and join.' The CHTC welcomed the opportunity to further strengthen the delivery of the minimum package of interventions.

Projects with the largest amount of funding usually took the lead in determining whether their intervention was delivered through CHWk or not. As the Expanded Programme on Immunization (EPI) usually had large amounts of funding, immunization projects included specific vaccines to be delivered through CHWk when they needed to. An example of this would be the measles-focused SIA campaign in 2010 which delivered 10 interventions. But in 2012, the immunization group initially only planned to deliver measles and polio vaccines because they were '*a bit reluctant to take on other interventions'* (CHTC member). The reluctance was thought to be due to EPI's hesitation in '*compromising the delivery of the vaccines*' (nutrition specialist), as delivering vaccines required an efficient logistical management of the cold chain and careful management of vaccines. Lobbying by the nutrition group enabled VA and deworming to be delivered alongside measles and polio, so they did not have to carry out separate campaigns. However, respondents indicated that even if a project offered extra funding to add on an intervention, a 'collective agreement' was still required from members of the CHTC.

5.5.3 Piloting of various services before inclusion

Suitability of new services within service delivery were assessed before they were included in the package of interventions delivered nationwide. After pilot testing in several districts during several CHWk events, some interventions were dropped from subsequent CHWk events and did not remain as part of the package of interventions for more than one to four rounds of CHWk. The following cases demonstrate the difficulties in going to scale with certain interventions due to the lack of project funding, human resource constraints or unsuitability of the delivery channel. Though the distribution of soap to promote hygiene and hand-washing in selected districts in 2007 has worked well, a nationwide distribution was not feasible due to the lack of

project funding to provide soap to every family with children under 5 years old. The case of EID of HIV demonstrated difficulties in identifying mothers to come forward to test their babies, though the intervention was incorporated into CHWk in approximately 15 districts. After broadcasting the EID availability in CHWk during 2009, they ceased to continue with the intervention as 'the numbers of children just went down and many people didn't come that year'. (Communication specialist) Retreating nets for malaria prevention during CHWk was tried for two years in 2003–2004, but insecticide-treated nets (ITNs) were introduced in 2004 and malaria control projects used their own distribution campaigns and routine distribution methods,[220] so that distribution of ITNs was not part of CHWk except in 2009 in some districts. As for integrated management of childhood illnesses (IMCI), it was suggested by CHTC that project managers pilot the incorporation of IMCI into CHWk in one region (Luapula) before going to scale in the entire country. However, screening every child for illnesses during CHWk was too time-consuming for the health workers, and CHTC declined to go to scale with IMCI through CHWk.

> *'The IMCI project managers wanted every child to be screened. But can you imagine screening every child during Child Health Week? You give vitamin A, then deworming, then you start checking every child if he has anaemia, take their temperature, everything! They tried it in one region, and that was the end of the story. So, we said no to IMCI because we didn't have money to support it and it took too much time for the health workers'* (Nutrition specialist, former CHTC member)

The fact that the different interventions had different target populations did not make the task easier for the health workers to add on more interventions. Identifying the appropriate target groups for multiple interventions was more time-consuming and complicated than simply delivering two or three interventions (Table 19).

Table 19 Target populations of interventions delivered through Child Health Week, Zambia (2005–2012)

Intervention	Target population	Age for Intervention
Vitamin A supplementation (VAS)	6 months–5 years	6, 12, 18, 24,30, 36 months
Measles-containing vaccine (MCV)	6 months –under 5 years	9 months
Oral polio vaccine (OPV)	Under 1 year olds	Birth to 14 weeks (3 times)

Deworming (DW)	1-5 year olds	12, 18, 24,30, 36 months
Tetanus toxoid vaccine	Pregnant women	--
Water, sanitation & hygiene (WASH)	All caregivers	6 weeks, 10 weeks, 14 weeks
Growth monitoring & promotion	Under 5 years	Weekly, then monthly
Behaviour change communication (BCC)*	All caregivers; community members	Continual

5.5.4. Districts as focal points for Child Health Week management

When the Zambian government adopted a national decentralization policy in November 2002,[221] which was launched by the president in 2004,[203] CHWk became a district responsibility. In line with increasing decentralization, the districts were expected to plan, finance, manage and deliver PHC services to the population within their respective health catchment areas, including CHWk. The financial flows had changed after the decentralization process, and the districts stopped obtaining specific funding to conduct the CHWk from the national level and were expected to manage CHWk within their district operational budgets that were disbursed to them on a monthly basis. Though there was evidence of central level support in terms of technical support, policy decisions, guidelines[222,223] and dedicated supervisors, the districts had to assume the major responsibility for planning, budgeting and implementing the strategy from 2005. Despite decentralization, the entire country of 72 districts (89 districts since 2013) continued to conduct CHWk twice a year.[224,225] The decentralized management and oversight may have affected performance on CHWk outcomes, apparent with the drastic decrease in VAS coverage outcomes starting around 2005 (Figure 23). Some respondents believed that VA coverage plummeted between 2004 and 2006 due to decentralization and because the districts stopped obtaining funds from the national level and partners earmarked for CHWk. Initially, there was funding from the partners coming through from the national level, but national and district respondents commonly noted that there was lack of sufficient funding to be able to implement both the CHWk strategy and conduct routine outreach health visits (R1, R2, R4, R5, R10, R13, R14, R15, R16).

5.5.4 Policy modifications at district level

Although the CHTC at the national level defined the contents of the package of interventions to be delivered within each campaign, there appeared to have been variations in the actual packages delivered at the district level. Announcements and reminder memos were often issued by the permanent secretary of the MCDMCH to the provincial and district medical officers indicating the specific interventions to be delivered during that particular round of CHWk. However, several respondents commented that the package of interventions actually delivered was often broader than the interventions they were instructed to deliver by the MCDMCH, leading to positive spill-over effects for the communities. The health workers wanted to maximize the opportunity to be able to bring as many services to the communities during CHWk, as they could not easily do so on other occasions. Despite being told to deliver only VA and deworming through CHWk, district and health workers continued providing other child health services including immunization, especially to the hard-to-reach communities:

> *'You want to take advantage of these mothers who turn up during Child Health Week because normally, that's when they come to get their services. Because when we go those areas that we normally don't go to during outreach, you want to give them a comprehensive package.'* (District health worker)

Another national health project manager explained the situation of wanting to provide more services than was instructed by the national level:

> '*You can't just give them [the children] vitamin A and turn them away.'*

If the communities were in far-flung, hard-to-reach areas, health workers brought as many services as they could, including services outside the campaign scope, such as family planning and antenatal care. Mothers also brought in their sick children with a fever during CHWk, and curative services such as antibiotics were provided. There were high expectations also from the communities to receive these services through these campaigns:

> *'The mothers want as many interventions as possible. It's kind of like a fair, you can go to all the posts and get everything.'* (National health specialist)

It was also considered 'very cost-effective', as noted by a national nutrition specialist for the health workers who travelled 20–30 km to reach a community to deliver more interventions than just VA and deworming. This is despite the fact that major decisions about which interventions to deliver, when to deliver them, which population to cover, and other essential decisions of this nature were made at the national level by the CHTC. Health workers at the health facility level used CHWk as an opportunity to conduct outreach visits, especially to hard-to-reach communities, as the districts were usually unable to visit these on a routine basis without the extra funding and transportation.

Many respondents supported the concept of delivering as many interventions as financially and logistically as possible during CHWk (R1, R2, R5, R6, R7, R8, R13, R14, R15). Their rationale for this was their perception that people living in many communities, especially in rural and remote areas, faced barriers to access to health facilities due to distance and geographic constraints, in addition to the shortage of trained staff or time constraints for working mothers to bring children for routine check-ups. Whatever the package of interventions, the majority of respondents spoke with pride of the CHWk strategy that enabled children to access essential health care at least twice a year. There was a widely shared belief that CHWk was an effective mechanism to deliver multiple services to communities that are otherwise inaccessible.

5.5.5 Constraints and challenges in delivering multiple interventions

This study demonstrated that co-delivery of interventions enables a considerable number of synergies including increased coverage and more effective planning due to strong partnerships and coordination, social mobilization and strong government ownership of the CHWk strategy, both at the national and district levels. Despite the fact that the majority of respondents were in favour of adding on as many interventions that were financially feasible to deliver, some common constraints encountered when attempting to deliver large number of interventions were reported. Frequently mentioned constraints included the lack of health workers,

heavy workload for health staff, decreased quality of care and extremely long waiting lines (queues).

5.5.5.1 Limited staff, heavy workload

The main challenge of effectively managing and implementing CHWk with multiple interventions was human resources, that is, the inadequate number of health workers and insufficiently trained staff at the health facility level. The district offices had to look for additional help to conduct the events. Any large-scale health campaign, especially with multiple interventions, requires extra health workers to manage and deliver essential services, especially when dealing with services requiring skilled professionals, such as injectable vaccines and family planning, or HIV-testing, in addition to supervising the community volunteers.

The acute shortages of health staff and insufficient resources allocated to the increases in the number of interventions frequently led to an increased burden on health workers. The lack of resource distribution particularly affects the outreach visits during CHWk:

> *'You need more people, you need more money, you need more transport, especially to reach outside of the health facility zone*. *Otherwise it won't be done.'* (National nutrition specialist)

On average, health facility teams during CHWk consisted of seven people, while outreach teams consisted of six people.[121] CHWk teams were composed of a mix of trained health workers, clinical officers, environmental health specialists, nutritionists and/or nurses who went from one community to another and worked with the community volunteers from that particular community. VA, deworming, GM, tagging children, retreating nets, tallying the number of VA/deworming administered and OPV were managed by the community volunteers. Even when supported by community volunteers, during CHWk health workers often experienced a high workload and extensive demands placed upon them in addition to their usual duties:

> *'Even if there are ten volunteers to work on the softer parts like growth monitoring, retreating bednets, provide vitamin A, deworming and even give polio drops, that one health worker needs to supervise them. But one health worker cannot do the vaccinations and all the other tasks alone as there are*

too many children. How many tasks can they really do?' (Child Health Technical Committee member)

A district worker explained:

> *'The main problem is understaffing. If we have enough human resources, it's not difficult. If there can be one person attending to say deworming, the health worker can give the jabs, and someone else is tagging, it doesn't take long.'*

Another impediment imposed on the health workers was the large numbers of children attending CHWk. Health facilities in the urban areas attend to roughly 375 children a day, while the rural teams attended to roughly 250, and outreach teams up to 300.[121] The task in rural areas is even more strenuous, as the CHWk teams split into those who provide services at the health facility and those who travel out to work in remote communities. A national level CHWk supervisor commented on what he observed during a supervisory visit:

> *'The numbers of children are so huge, it's overwhelming. I feel sorry for the poor health workers.'*

Each outreach team provides services to seven or eight sites during the six-day CHWk round. The teams generally go out for two or three days before the six-day CHWk event to ensure that all preparations are in place and to organize the community volunteers, in addition to coordinating social mobilization efforts.[121] Regardless of the number of interventions they are expected to deliver, the team usually stays engaged in the CHWk for six days; the teams are not necessarily given more days to carry out the full range of tasks in the campaign. A point that was reiterated by the majority of respondents was that additional human resources, namely more skilled and trained health workers at the health facilities level, were crucial to running the CHWk more efficiently, especially when increasing the number of interventions delivered.

(CONSTRAINTS, shortage of staff, HUMAN RESOURCES, incentives, overall job load, personnel, orientation)

5.5.5.2 Decrease in quality of services delivered

Another challenge that was reported relates to service delivery itself, with the decrease in quality of services as the number of interventions increased. Given that most health facilities had limited number of staff to provide more interventions within a specified period of time, some respondents indicated that delivering more interventions meant that some aspects of the quality of the work were compromised. For example, a high volume of interventions would lead to a decrease in practising adequate hygiene.

> '*The community volunteers cannot wash their hands between giving vitamin A capsules after cutting it open with scissors or grinding and giving the deworming tablets for the children aged one to two years. Even if they touch something, they continue to squeeze vitamin A or give the tablet into the child's mouth.'* (National nutrition specialist)

Another example was the inability to make sure that the children were taking the deworming tablets. As standard protocol, the health worker or volunteer should give one deworming tablet directly into the mouth of the child if a child can chew. If the child is aged 1 but under 2 years and cannot chew due to lack of teeth, the tablet is crushed and given to the child:

> *'But when you have a lot of work to do, like you have to tidy, vaccinate, and give vitamin A, sometimes we just give the tablet to the mother and say, 'Go and give it yourself'. Sometimes the child will spit it out, so it means that we are not doing the correct thing.'* (District health worker)

As noted earlier, a study showed that it takes on average of two minutes to deliver VA or infant vaccination, four and a half minutes for growth monitoring, and over seven minutes for breastfeeding promotion, HIV counselling and testing or attending sick children.[161] If quality is to be measured by the interactive time which the child spends with the health worker,[226] having to deliver multiple interventions to a multitude of children decreases the amount of time the workers spends on each child.

5.5.5.3 Long waiting times

Delivering multiple services to people was a logistical feat, as the number of interventions in the campaign package increased, the number of service booths increased, therefore prolonging the waiting time for the caregivers and children to receive services. Three respondents who were in favour of CHWk recommended not

having too many services because of the waiting time factor for the caregiver. A mother and baby or child would often wait three to six hours to obtain all the provided health services during CHWk. A national CHWk supervisor described the long process of a mother going through a typical CHWk day to obtain services for her 12-month old child, queuing to receive each of the different interventions:

> *'First, the mother must put her child in the weighing bag for growth monitoring. She's given some nutritional counselling.*
>
> *Then, she queues up for the vitamin A capsule.*
>
> *Then, the child is given mebendazole [for deworming].*
>
> *Then, because he missed out on measles [according to his vaccine schedule], he gets a measles jab and another vaccine he missed out on.*
>
> *Then, the mother goes to where they are giving meds for retreating bednets. She goes and queues there.*
>
> *Then, she joins the queue for soap.*
>
> *And if they are doing HIV testing, then she goes to that stop.*
>
> *Can you imagine how long it takes for a single mother to pass through all these services, when there are so many children to attend?'*
>
> (National health project manager)

Increased numbers of interventions during CHWk increased the demand on the already overstretched health workers. However, regardless of the long waiting times, the advantages of providing multi-intervention packages outweigh the concerns; an overwhelming majority (11 out of 14 who were asked the question) of respondents were in favour of having as many services as possible to bring to the population during CHWk.

5.5.5.4 Reporting challenges with multiple interventions

Challenges related to monitoring, namely reporting and surveillance, was another main constraint found when working with multiple interventions. As new projects and new interventions were initiated, some of these did not provide monitoring and reporting tools that could be integrated into the existing reporting system for the large-scale campaigns. When new interventions implemented in fewer districts with differing target populations, coverage could only be reported on the actual number of beneficiaries who received the services and not the percentage coverage.

There was also a hierarchy of reporting in some cases. Reports obtained from the provincial-district levels could lead officials at the national level to presume that nationally selected interventions were the only services delivered at the health facility and community outreach levels. This analysis and others[227] have shown that this was not the case. Services provided during CHWk are recorded on tally sheets, although only a subset of all services were tracked by the central health office, namely for VAS, deworming and measles vaccinations.[121] Even if there were other interventions delivered, a national monitoring specialist noted that the districts did not report on each of these, such as GM, nutritional screening or BCC, because they were not required to do so:

> *'When [*the districts] *are now in charge of their own things, there's no incentive for them to report on time, and there are no real serious sanctions if they are delayed in reporting.'* (National CHTC member)

In a measles campaign where measles was the primary intervention, the districts also provided other vaccines such as pentavalent, polio and BCG, without reporting to the national level in relation to these. In the case of campaigns where the districts and health facilities were only to focus on nutritional interventions (2013–2014), more services were provided than instructed, though official letters were sent directly from the national level to the districts. CHWk continued to be a mechanism to obtain catch-up vaccinations and to conduct growth monitoring and other activities, even though the organizers were instructed to focus only on providing VA and deworming[227].

5.6 Discussion

This study revealed several enabling factors for successful CHWk implementation pertaining mainly to management and communication particularly when delivering multiple interventions. Political stability and strong government capacity and stewardship in Zambia have been vital, not only to achieve an effective oversight of the CHWk strategy but also to maintain a continuous funding flow from external partners to support the events. The high levels of buy-in and expectation by communities also provided a solid base for expanding CHWk, as it was considered

feasible to augment the strategy without having to do much to boost demand for these services.

However, many of the enabling factors were unique to Zambia, and other LMICs – especially those with weak health systems and transient governments – may need to carefully consider their own unique enabling and constraining factors before incorporating too many additional interventions within any campaign. The absence of these critical enabling factors may undermine the successful implementation of multi-component campaigns in other LMICs. Even where these conditions exist and where the campaign effectiveness in terms of short-term health coverage levels remains largely positive, the long-term implications need to be considered in delivering multiple strategies through ICHEs, as this approach may have negative consequences for the health system as shown in other studies. [119,162]

This study showed that one of the main challenges in effectively managing and implementing CHWk focuses on human and financial resources, with the inadequate number of health workers and insufficiently trained staff at the health facility level,[195,215,217] a finding supported by the fact that Zambia has about half the health workforce that it needs.[179,181,228] This finding is consistent with other studies that reveal this health worker shortage as being acute and problematic in terms of delivery of complex campaigns throughout sub-Saharan Africa.[229-231] The consequences of implementing large-scale campaigns on the scarce human resources for health, especially in areas with logistical hardships, needs to be considered. A large number of health facilities and health posts in Zambia, especially those in rural areas, are severely affected by critical shortages of qualified health workers and are, in some cases, forced to depend on untrained personnel.[232] Although the Zambian government has recognized the shortage of health workers, and has taken major steps in alleviating the problem by creating additional health posts and training new community health assistants,[233,234] it is still questionable whether these additional cadres, who are not trained to provide injectable vaccines, could support the alleviation of reducing health workers' workload and increasing adequately trained

health workers, along with bringing appropriate skills that are urgently needed. The combination of an institutionalized CHWk and the lack of adequate financial and human resources invested in district health management have the potential to disrupt the provision of routine child healthcare services in the long term. The overall lack of financial and human resource allocation for district health management could be supported by donors, who could fill this gap by strengthening these relatively weak components of the health system.

This study included interviews with a relatively small sample of key informants, especially at the district level, and the accounts presented may have led to certain biases in the information collected. However, the study involved a preparatory phase, which included mapping and country-level engagement that helped to identify respondents who can provide information pertinent to the study objectives. The attention to the sampling process and consultations at country level indicated that the key informants interviewed had substantial roles in CHWk and were in a position to provide in-depth accounts of the history of CHWk, and a nuanced picture of the factors that shaped CHWk as it evolved. Also, this study sought to examine the evolution of the CHWk strategy from a national perspective, and less so from the grass-roots level, therefore the focus was on interviewing national level stakeholders, but discussing their interface with district level actors. However, the district respondents' accounts highlighted a range of important issues relating to that level that confirmed and triangulated the narrative derived from the national level research. Efforts were made to select key informants with a variety of specialization —health, nutrition, immunization, communication, etc.—to highlight the different aspects of design and implementation of CHWk. Steps were also taken to mitigate against the potential causes of bias by triangulating data and perspectives with information from other sources, including secondary data analysis and extensive document review.

5.7 Conclusions

A set of unique enabling factors facilitated the expansion of multi-component ICHEs in Zambia—stability, effective government stewardship, and donor support—but they remain highly dependent on consistent resource allocation and support to local implementers. An exclusive focus on campaigns can create a 'lock-in' and disrupt routine delivery of essential services therefore having a long-term plan to sustain the gains is critically important. Incorporating multiple additional interventions in other LMIC contexts, therefore, should be undertaken cautiously and be guided by an in-depth analysis of the local enabling environment are to that country in order to assess the best way forward.

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PLEASE NOTE THAT A COVER SHEET MUST BE COMPLETED FOR EACH RESEARCH PAPER INCLUDED IN A THESIS.

SECTION A – Student Details

Student	Mahoko Kamatsuchi
Principal Supervisor	Dina Balabanova
Thesis Title	Learning from Implementation of Integrated Child Health Events: Lessons from Global Practice and the Experience of Zambia

If the Research Paper has previously been published please complete Section B, if not please move to Section C

SECTION B – Paper already published

Where was the work published?			
When was the work published?			
If the work was published prior to registration for your research degree, give a brief rationale for its inclusion			
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SECTION C – Prepared for publication, but not yet published

Where is the work intended to be published?	Health Policy and Planning
Please list the paper's authors in the intended authorship order:	Mahoko Kamatsuchi, Mike Mwanza, Sandra Mouniver-Jack, Wilbroad Mutale, Dina Balabanova
Stage of publication	**Not yet submitted**

SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	MK collected and analysed data. MM organised data collection in field. MK DB wrote the manuscript. MK DB SMJ MM WM read, revised and approved the manuscript.

Student Signature: _____ **Date:** 27 May 2016

Supervisor Signature: _____ **Date:** 27 May 2016

Chapter 6 – Paper 4: National policy changes to de-emphasize Child Health Week in the context of faltering routine immunization: the case of Zambia

6.1 Abstract

Background

Zambia has 15 years of experience in conducting integrated child health events (ICHEs) including Child Health Week (CHWk) and measles supplementary immunization activities (SIAs). The strategy has evolved through a series of iterations starting with two interventions, up to 10 interventions through week-long health services delivery campaigns since 1999. From 2013, the number of interventions was abruptly reduced to two once again, focusing mainly on vitamin A (VA) supplementation and deworming. There are important lessons to be learned from the Zambian adaptation of CHWk over time and the current move away from the multi-component strategy.

Objectives

To explore the rationale behind the reliance on the CHWk strategy in Zambia and the subsequent abrupt move away from that campaign strategy after 2013.

Methods

The study used the implementation research conceptual framework components as units of analysis, and followed a framework analysis[148] with a theme-based presentation of the findings. Semi-structured interviews were conducted with national and district stakeholders and data from document reviews were also integrated into the findings. Data analysis was conducted using NVivo 10.

Findings

Delivering basic immunization became the norm during the bi-annual CHWk due to the lack of district resources to compensate for logistical difficulty in access, lack of facility personnel and funding to continue carrying out routine outreach visits. The combination of institutionalized yet donor-supported bi-annual CHWk and the lack

of financial and human resources invested in district health management could potentially disrupt the adequate provision of routine immunization, and consequently basic child health services, in the long term. However, the abrupt policy change at national level did not necessarily translate into action at the district and health facility levels due to community buy-in and expectation to receive CHWk services.

Conclusions

The Zambian experience demonstrates that careful consideration is required before attempting to expand a multiple intervention ICHE-strategy, with robust analysis of both factors conducive to implementation as well as mitigating unintended and potentially harmful impacts on the underlying health system. Continuing with ICHEs to meet immediate needs, and at the same time, a gradual and careful transition towards strengthening the health system need to be conducted in parallel, which is critically important in achieving and sustaining long-term child mortality gains.

6.2 Introduction

Zambia has a sustained history of conducting ICHEs,[189,190] which in this study include both CHWk and measles SIA.[§§§] The CHWk strategy has developed going through a series of adaptations starting with two and rising to 10 interventions through week-long health services delivery campaigns. CHWk is commonly perceived as institutionalized, and almost a routine delivery model in itself. Community members wait for CHWk, which is held twice a year, to access the necessary health services for their children, whether for preventive care such as VA supplementation, deworming tablets and basic immunization, or curative care for sick children who are brought in during the week to be seen by health care workers.[133] Caregivers travel long distances with their children to obtain essential health care services, despite the long queues required to receive the services provided.[133]

The role of CHWk is significant, especially in delivering VA supplements to children aged from 6 months to 5 years old. After age 1, it is often difficult to reach children on a routine basis to supplement them with VA twice a year.[217] Because there was also a tendency for children not to be fully immunized,[217,235] catch-up vaccinations were included in the package of interventions for CHWk to facilitate the catching-up of the 20% of children who missed their vaccinations. Other vital child health interventions have also been gradually added throughout the years, culminating in 10 interventions in 2010 during a measles SIA campaign (Table 18). Despite the increased number of interventions delivered through CHWk, and their documented success in achieving high coverages of specific interventions such as VA supplementation (VAS) and measles vaccines,[14] the number of interventions delivered through CHWk was abruptly reduced to only two from 2013 (VAS and deworming). As Zambia was already close to reaching its MDG goals of reducing child mortality by one-thirds by 2015,[15] (Figure 22) and ranking one of the highest among the fastest growing economies in Africa, (2014)[185] the reduction in the number of

[§§§] Disease-prevention immunization-focused integrated campaigns such as measles SIAs are also ICHEs, though their frequency is based on disease control priorities and when disease outbreaks occur, and they are not limited to six-monthly schedules as in CHWk. However, measles SIAs are usually scheduled to fit the bi-annual schedules of CHWk in Zambia.

interventions in CHWk from 10 (in 2010) and 6 (in 2012) to two interventions may have been due to the health ministries' decision of no longer finding it necessary to focus on campaign-mode of child health service delivery, as they were making good progress towards child mortality reduction goals.

This study examines the various factors behind why Zambia began to rely on CHWk to deliver key essential child health services, and the reasons for suddenly scaling down the strategy in 2013. It explores the rationale behind moving away from a wide-scale delivery strategy, based on the various perceptions and reactions of key stakeholders related to the decision of reducing CHWk.

6.3 Objectives

To explore the rationale behind the reliance on the CHWk strategy in Zambia and the subsequent abrupt move away from that campaign strategy after 2013.

6.4 Methodology

The study was underpinned by an implementation research framework and examined CHWks that took place in 1999–2014. Semi-structured interviews were conducted with national and district stakeholders combined with extensive searches of country reports, published and grey literature. Data-gathering was initiated in August 2011 up to August 2014, while fieldwork in Zambia took place in May 2014. Seventeen individuals were interviewed, out of which 13 were based in Lusaka while four were from two districts. Six informants were involved in CHWk for over 10 years, while a total of 13 for more than five years. Ten were government staff, while seven were from development partners. Informed consent was obtained from interviewees and results are reported in an anonymous manner. The conceptual framework was used to obtain interview data, and NVivo 10 was used to organize, code and analyse the transcribed interview data and other data sources. The conceptual framework and methodology are described in more detail in Chapter 2.

6.5 Findings

The findings are presented by major themes that arose from the data analysis, based on the conceptual framework components (Section 2.1) and NVivo codes (Appendix 9). The components and codes that the information was derived from are indicated after each sub-section in the paper. The findings examine how Zambia developed and expanded its CHWk campaign delivery strategy, with a reliance on CHWk to deliver essential child health services. The potential reasons why Zambia may have abruptly changed course and moved away from this strategy from 2013 onwards, are explored.

6.5.1 Child Health Week and declining coverage of routine immunization

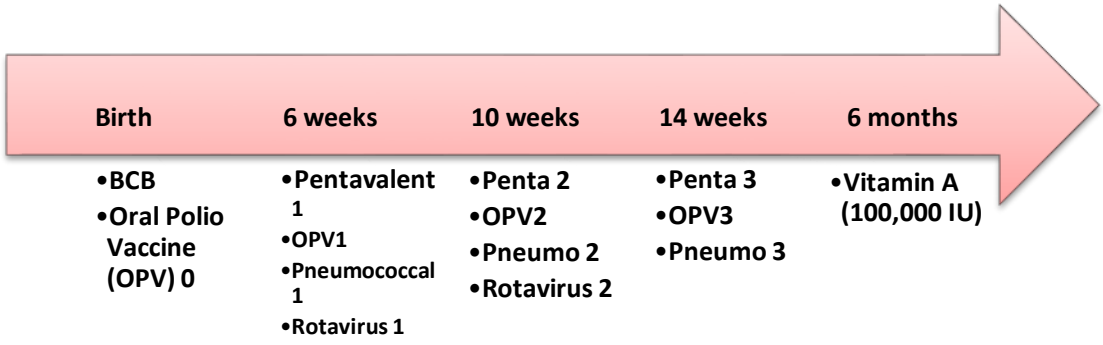
The original minimum package of interventions which initiated CHWk in 1999 included VAS, deworming, catch-up vaccinations, retreating bednets, growth monitoring (GM) and behaviour change communication (BCC) (Image 1). Vitamin A was the original thrust of the strategy, and was distributed nationally to children aged 6 to 59 months. Because there was a tendency for mothers not to come back to get their children fully immunized,[217,235] catch-up vaccinations were included in the package of interventions to 'chase' the 20% of eligible children who had missed routine immunization doses (Table 19). Basic vaccinations consisted of Bacillus of Calmette and Guérin (BCG) (tuberculosis vaccine), four doses of OPV, three doses of DPT-HepB-Hib (pentavalent vaccine) and measles. Three more vaccines were introduced in 2013 (e.g. pneumococcal, rotavirus and measles second dose[236]) (Table 19, Figure 25).

Image 1. Child Health Weeks

Table 20 Childhood immunization and vitamin A schedule, Zambia (2014)

Vaccine	Age for vaccination	Method of administration
BCG	Birth	Injection
OPV0	Birth to 13 days	Oral
OPV 1, 2 & 3	6 weeks, 10 weeks, 14 weeks	Oral
DPT-HepB-Hib 1, 2, 3 (Pentavalent 1, 2 & 3)	6 weeks, 10 weeks, 14 weeks	Injection
Measles 1 & 2*	9 months, 18 months	Injection
Pneumococcal conjugate*	6 weeks, 10 weeks, 14 weeks	Injection
Rotavirus*	6 weeks, 10 weeks	Oral
Vitamin A	6, 12, 18, 24,30, 36, 42, 48, 54, 59 months	Oral

*Introduced in 2013



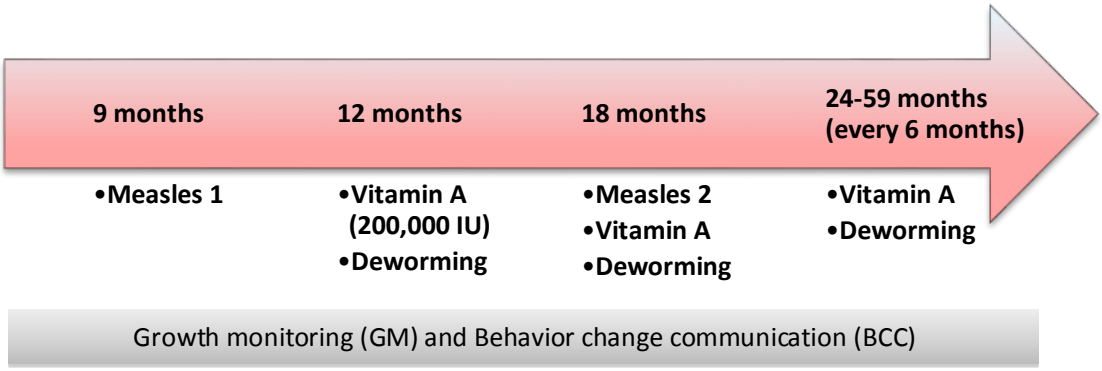


Figure 26 Child health interventions schedule, according to child's age – birth to 5 years

CHWk was never intended to be a basic mechanism to deliver routine immunization to the majority of children. The Expanded Programme on Immunization (EPI) was initiated in Zambia in 1975, with the understanding that vaccination services would be delivered in a static mode at health facilities, in addition to regular outreach sessions for those communities too far from fixed health centres.

A UNICEF EPI report on Zambia[202] indicated that immunization coverage has been slightly declining since 2009. Routine immunization coverage levels (Penta3/DPT3) have averaged around 84% from 1987–2011,[237] but the coverage decreased slightly from 2012 onwards with 78% in 2012 and 79% in 2013, breaking below the 80% mark (Figure 27). There were also slight decreases in other vaccines in routine immunization coverage from around 2011 as shown in measles-containing vaccines (MCV1) (Figure 27) and more noticeably in OPV3 (polio) (Figure 29).

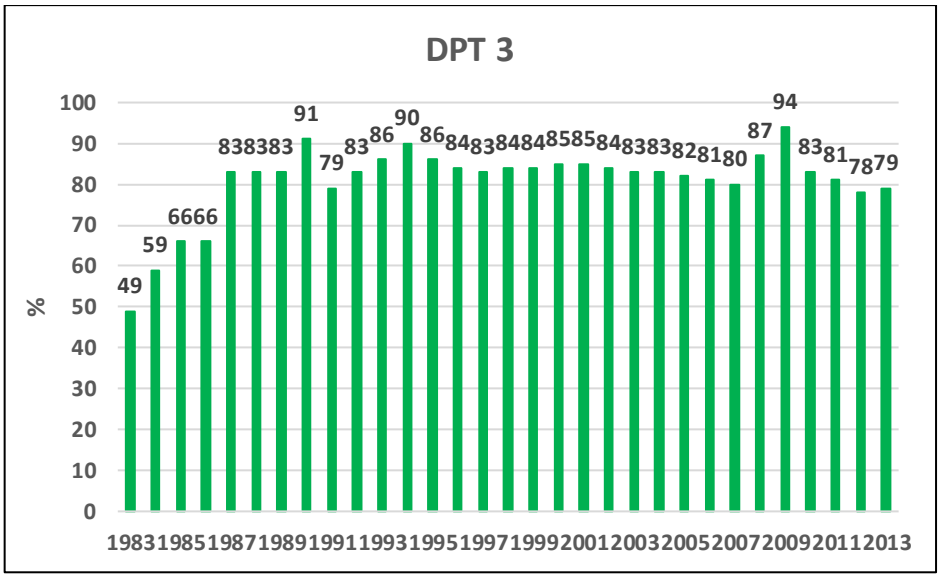


Figure 27 Zambia: DPT3/pentavalent (PENTA) 3 routine immunizations coverage, 1983–2013

(Source: WHO/UNICEF Estimates of National Immunization Coverage (WUENIC), 2013)

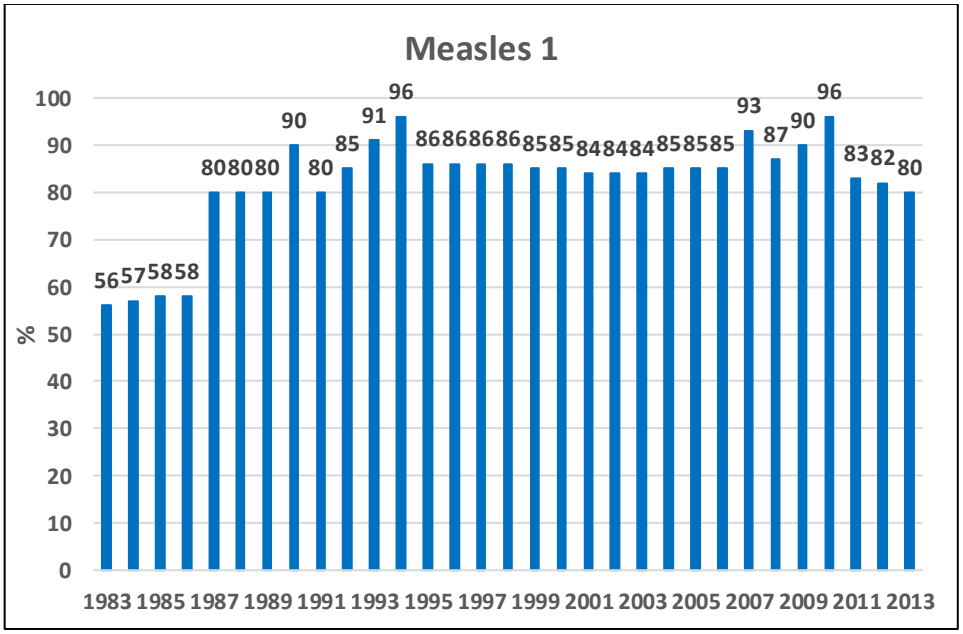


Figure 28 Zambia: measles routine immunization coverage 1984–2013

(Source: WHO/UNICEF Estimates of National Immunization Coverage (WUENIC), 2013)

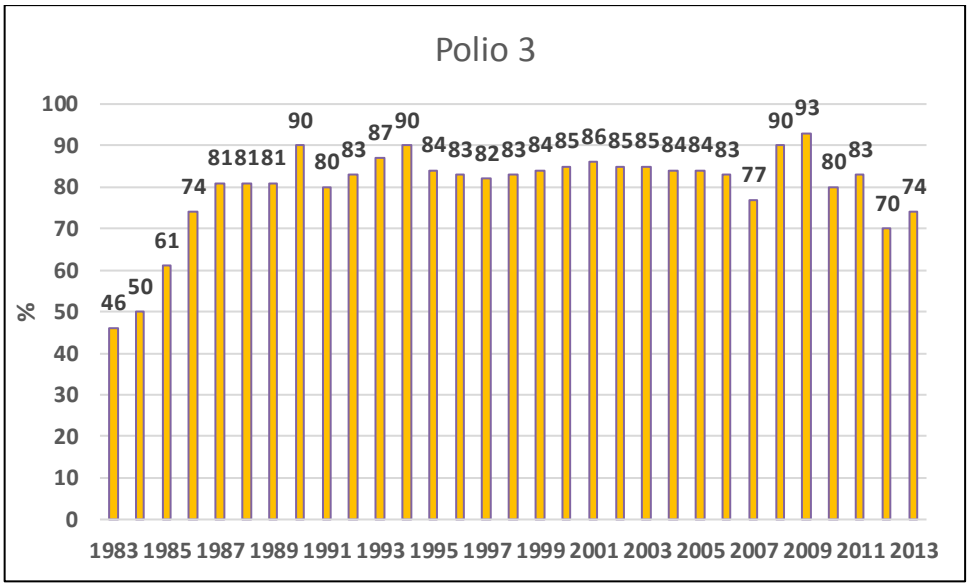


Figure 29 Zambia: OPV3 routine coverage 1983–2013
(Source: WHO/UNICEF Estimates of National Immunization Coverage (WUENIC), 2013)

The majority of respondents at the national level were not made aware of the policy statement or consultative processes in the decision and the reasons behind the reduction of the number of interventions. (R1-R3, R5-R6, R8, R10-R11, R14-R16.) Some 75% of the informants were uncertain of the real reasons for the toning down of CHWk. A memo from the Ministry of Community Development Mother and Child Health (MCDMCH)[238] in 2013 indicating the focus of CHWk to only VA and deworming was found after multiple inquiries. However, there was no official policy change or explanation of the sizing down of CHWk to the national level Child Health Technical Committee (CHTC) at that time, nor was there an explanation of the reasons for the abrupt change in the CHWk campaigns that had been the norm for over a decade. A national level health specialist remarked:

> *'I have not seen a policy statement [of the change] so to say, but sometimes when we hear about these memos or instructions, we take that to be the policies* [laughter].'

6.5.2 Decentralization of Child Health Week

A main contributing factor as to why the districts started to rely on Child Health Week as a key delivery strategy started with the effect of decentralization, adopted in Zambia in the early 2000s. CHWk became a district responsibility as the Zambian government adopted a national decentralization policy in November 2002,[221] which was subsequently launched by the president in August 2004.[203] In line with increasing decentralization, districts were expected to plan, finance, manage and deliver PHC services to the population within their respective health catchment areas, including CHWk. The financial flows had changed since 2005 after the decentralization process, and districts stopped obtaining specific funding to conduct the CHWk from the national level and were expected to manage it within their district operational budgets that were disbursed to them on a monthly basis.[195]

> *'Some districts raised money for the Child Health Week to not have to depend so much on the central level, and the district government gradually took over CHWk.'* (National nutrition specialist)

Prior to decentralization, every district used to receive a budget from the national level, particularly for CHWk covering all components of the campaign – money for fuel, allowances for health workers and staff to travel to remote communities, incentives for the volunteers and funds needed to popularize the event. However, post-2005, district operational grants were allocated on a per capita basis, taking into account population density, price of fuel, likelihood of epidemics and the presence (or not) of a bank.[179] These operational grants were to encompass all health activities for the district, such as CHWk, routine outreach health visits for remote communities, family planning and other district health-related activities. For every annual plan, the districts included CHWk within their allotted budget, without taking into consideration the number of interventions to be delivered.

The decentralized management and oversight may have affected performance on CHWk outcomes with mixed results, apparent with the drastic decrease in VAS coverage outcomes starting around 2004 (Figure 23). Some informants believed that VA coverage plummeted between 2004 and 2006 due to decentralization and

because the districts stopped obtaining funds from the national level and partners specifically for CHWk:

> *'Because they stopped giving funds externally, that's why you see the coverage went low. When you look at the trend before 2005, you see that the coverages were better, because then it was always money being mobilised from the central level.'* (National nutrition specialist)

The low VA coverage was thought by a national level nutritionist to be a reflection of the adjustment from central- to district-level management of CHWk. Another NHTC member said:

> *'The ball was really in the districts' hands to decide how much they put in balance for other interventions, such as promotion of infant and young child feeding, other vaccines, malaria and everything else they're supposed to do. I think it was learning ownership and there was also a mind-set challenge.'* (National Child Health Week specialist)

Numerous national and district respondents noted that there was lack of sufficient funding to be able to implement both the CHWk strategy and conduct routine outreach health visits (R1, R2, R4, R5, R10, R13, R14, R15, R16). Measles SIAs conducted in 2007, 2010 and 2012, on the other hand, were financed directly from the central level with funding given by various donors[239] (US$2 million in 2012;[198] U$8.5 million in 2012[199]). During these campaigns, VA coverage once again increased dramatically to over 90% administrative coverage, and measles also attained high coverage (>90%) (Table 18), demonstrating the successes of obtaining high coverages through these campaigns.

Regardless of decentralization, the decisions about which interventions to deliver through each CHWk were usually made at the national level by the CHTC. The CHTC, consisting of the government technical specialists along with multi- and bilateral organizations and NGOs partners, played a major role in deciding on the interventions to be delivered during that year's campaign.[133] A CHTC member explained where the decisions are made regarding the type of interventions delivered through CHWk:

> '*The vision and direction comes from the centre, and the districts are told what Child Health Week should do*.' (National health specialist)

Another CHTC member raised a concern:

'Child Health Week should be introduced as one of the interventions and let the district decide whether that intervention is necessary for them or not. But as for now, the Zambian districts are not decentralised.'

The CHTC was generally in favour of adding more interventions as long as the interested partners provided sufficient funding to support the districts with more personnel, logistical support, implementation and monitoring tools to run the campaigns.[133] There was no clear guideline on how the type and number of interventions was to be decided, but the CHTC brought their recommendations to the permanent secretary of the MOH (or MCDMCH since 2012), seeking endorsement of the intervention package. With the realignment of maternal and child health (MCH) functions from the MOH to the MCDMCH in 2012, the operationalization of CHWk was overseen by the Child Health Unit under MCDMCH, while the MOH oversaw the logistics of supply distribution to the provinces and medical procurement relating to CHWk. For every CHWk event, there was an issuance of a letter from the MCDMCH (issued by the MOH prior to 2012) to the provincial and district health offices indicating what package of interventions should be delivered through CHWk and the dates when the campaigns should occur. The senior management within the MCDMCH had the ultimate decision as to the type and number of interventions to be delivered through CHWk, which at times did not reflect the views of the CHTC.

6.5.3 Package modifications at the district level

Though the national level defined the package of interventions to be delivered, there appeared to be variations in the actual interventions delivered at the district level, leading to positive spill-over effects for communities. Most informants, both at national and district levels, favoured bringing a comprehensive package of services to communities during CHWk, as they found it a great opportunity to provide a large number of services to children who would usually be unable obtain them. Regardless of which interventions the national level instructed the districts to deliver, it became apparent that the district- and health facility-level personnel brought more services

to communities during outreach visits in CHWk. A national CHTC member noted that during a CHWk supervisory visit in 2014, though the districts were instructed to deliver VA and deworming only, they were also providing basic immunization and other services. But a national nutrition specialist justified why the districts would provide more services than called for:

> '*If they miss the children who missed their vaccines at this point, how are they going to get them*?'

Similarly, during the measles SIA campaign in 2012:

> *'We wanted to make sure that we give a focus on measles nationally. But when I went down to check what has happened at district level, it was different. All the antigens were being given.*' (National health ministry staff, on a SIA supervisory visit)

A district representative said blatantly:

> *'We don't mind affecting routine immunization coverage. What we are interested in is to reach children so that they get their services.'*

Many respondents were in favour of delivering as many interventions as financially and physically possible during CHWk (R1, R2, R5, R6, R7, R8, R13, R14, R15). The main reason for this was that the informants believed that many communities, especially in the rural and remote areas, did not have easy access to health facilities due to distance and geographic constraints, in addition to the shortage of trained staff and time constraints. Some respondents believed that the districts would continue delivering multiple interventions during CHWk as they were so accustomed to doing so, despite the instructions to minimize the delivery of interventions from the national level

6.5.4 Increased reliance on Child Health Week for routine immunization

Numerous national and district managers commented that many health workers did not go out to conduct outreach visits for routine immunization because they were waiting for CHWk (R1, R4, R5, R7, R9, R10, R12, R15, R16). Many believed that the health workers and caregivers relied more on providing and obtaining children's vaccinations through CHWk due to unsecured financial resources in the districts for

routine outreach visits and more secure financial availability for CHWk, shortage of health workers, and difficulty of access to remote communities by the health workers. Other studies have already shown that sustaining high levels of routine immunization coverage is difficult in Zambia due to the shortage of human resources for health, inadequate transport and difficulty of access, especially in rural areas, along with inadequate training for routine EPI at the district management level, and insufficient financing at district levels for outreach.[240,241] This study further confirmed all of the above issues, as described in following, but in the context of relying on CHWk to compensate for the difficulty in sustaining high levels of routine immunization.

6.5.5 Financial resource constraints for routine immunization outreach

Financial shortfalls in the districts' operational grants were perceived to be a major impediment that hampered routine outreach delivery of immunization, thus resulting in more reliance on CHWk to deliver immunization. There were recurrent comments that the districts were not receiving their full monthly operational grants from central government, even if it these were being budgeted for (R1, R5, R6, R10, R13, R14, R16).

> *'At a critical point in that critical month when the budget goes down, the manager may say, "Forget the routine. Let's just do Child Health Week."'* (National health specialist)

> *'The district medical officers told me that the decision is you have to run the health centre, and pay the salaries of people. So you just have to forget about the outreach because it requires [per diem] and fuel.'* (Development partner)

Many expressed the disappointment that operational grants were not sufficient to cover routine immunization outreach costs (R6, R10, R13, R16), and that fundraising efforts at the district level could only be made for conducting CHWk. Several respondents noted that district and health facility staff conducted outreach visits during CHWk to areas that they normally could not go on a routine basis (R1, R5, R14).

> *'There is no funding in the districts to support routine immunisation. If you go to each district, they do have plans for routine, but the money is not there to support it.'* (National CHTC member)

What appeared to be the most affected were the outreach visits to remote communities. The lack of funding for per diem and other logistical costs at the district and health facility levels was thought to be one of the main constraints in conducting

routine outreach visits to remote communities, thus the reliance on CHWk to compensate for the gap. When conducting outreach visits, health workers obtain lunch money (20–30 kwachas (ZMW)/US$3–4 per day (2014)) or per diem to stay overnight (50 ZMW/USS $7 per day) when travelling to remote communities, in addition to covering staff who work out of their normal stations.[****] The incentive fees paid during CHWk and routine visits are the same and are standardized for both the health workers and national supervisors. National health project managers indicated that Zambia's health personnel at all levels were paid regularly, adequately and on time (as of 2014), and the salaries of health care workers improved and have been steady, meeting the requirements of being paid above the minimum wage. However, a partner agency staff member questioned whether the districts were actually receiving the total funding required for conducting routine outreach visits.

As the districts do not receive sufficient monthly operational grants to conduct routine outreach visits, they fundraise for CHWk, as they are still keen to provide health services through outreach visits during CHWk even if only twice a year. The districts seem to have less difficulty in mobilizing resources for CHWk than for routine outreach, as CHWk captures considerable political and financial support, including from donors, and receives high attention from the media. Several national managers noted that district staff are more motivated to conduct outreach during CHWk because they can often request logistical support from local partners and other district departments, and they can attend many more children at one CHWk session than in conducting several routine visits. As is usually the case, political visibility and funding for routine immunization can be fairly limited because of its routine nature.[242] CHWk has become an increasingly viable mechanism to deliver core services that all distribution sites are expected to provide, such as VA, deworming, GM, immunization[121] and other nationally-led interventions.

[****] The government standard is 50 ZMW (US$7) per day for any civil servant if they travel eight hours or 15 km away from their workplace; community volunteer workers receive 20–30 kwachas per day (US$ 0.01 before 2013 or US$3-4 with current exchange rate) for lunch money. (Rate as of May, 2014).

6.5.6 Supplementing health workers for Child Health Week

Another phenomenon frequently mentioned regarding the reliance on CHWk to deliver routine immunization was the overall shortage of health workers.[181,233] Due to the general shortage of health workers in Zambia,[180] the district offices require additional resources to conduct outreach visits. More health workers are made available for CHWk, as there is more financial and logistical support available during CHWk. During CHWk, health facilities can continue to provide routine health services on demand, while the other half of the staff can provide CHWk services, both in the facility and as part of the outreach teams. District health offices are able to request retired staff and nurses on leave to help out and obtain support from provincial staff for the campaigns. There is approximately one outreach team per health facility and each outreach team provides services to seven or eight sites in one six-days CHWk event. In this way, the number of temporary outreach posts also increases during CHWk, a phenomenon which is difficult to replicate for the continuous routine provision of services.

6.5.7 Logistical difficulties in accessing the hard-to-reach for routine visits

Another key problem in systematically conducting routine outreach visits for immunization (and other services), and therefore reverting to CHWk, was the difficulty of access of health workers to remote communities. The distance from the rural areas or outreach sites from the health centres can be up to 30 km, and health workers need to use motorbikes, local transport, office vehicles or even walk when travelling to these remote areas during their outreach visits. In areas that are difficult to access, health workers and caregivers who come to CHWk walk in swamps, sand and flooded areas, ride in canoes, or climb through mountainous terrain. Several national-level supervisors who visited CHWk sites re-emphasized that no matter how much incentives are given to health workers to conduct outreach visits, these areas remain extremely difficult to reach. Compounding the health service gap between rural and urban areas,[243,244] about three in every five women in rural areas (57%) (in contrast to less than one in five (13%) in urban areas) reported that the distance to the health facility posed a major barrier in seeking health care when they are sick.[245]

The EPI national coverage survey (2011)[235] showed that the health centre was the greatest source of vaccination services (77%), followed by outreach (11%) and hospital facilities (10%) (Table 21).[246] If there is a tendency to rely on CHWk to deliver basic immunization, then it is unavoidable that routine immunization for the 11% for those obtained through outreach will falter, as CHWk comes around only twice a year.

Despite these hardships of logistical access, many informants observed the hard work, commitment and determination of the health workers and CHWk teams to reach the children during CHWk (R1, R5, R6, R7, R8, R13). The health workers were 'happy to immunize so many children' (with basic immunization) during CHWk regardless of the difficulties in accessing these remote communities, commented a national CHWk specialist.

Table 21 Place where childhood vaccination are obtained, Zambia
(MCDMCH, 2011)

Source	%
Health centre	77.4
Outreach	11.1
Hospital	10.5
SIAs	0.8
Private	0.1
NGO	0.1

Childhood vaccination = BCG, OPV3, DPT3/Penta3, measles

6.5.8 The mismatch of campaign and routine immunization schedules

For many children, childhood immunization schedules do not coincide with the bi-annual CHWk schedule (Table 19). A national nutrition specialist explained the development of this mismatch of schedules of routine immunization within CHWk:

> *'Child Health Week was originally supposed to be done twice a year for vitamin A. Then EPI used Child Health Week to be the thrust for immunization and added on their agenda of routine immunization. But the schedules don't match.'* (National nutrition specialist)

The distinction between catch-up vaccinations given at campaigns and routine immunization may have become blurred for health care providers and communities, a tendency also shown in numerous other countries.[247] As a result, there was a relatively large number of children getting vaccinated during the twice-annual event, as shown in the data available from 2008 (Table 22).[217] The high numbers of children vaccinated for basic immunization during CHWk could indicate that many children were vaccinated after the appropriate time when they should have been given the vaccines; that is, those children were not vaccinated when they should have been. A national EPI coverage survey (2011)[235] assessing the actual national vaccination coverage of under-2 children showed that while fully immunized children's coverage was 81%, only 22% were vaccinated according to the national vaccination schedule respecting the recommended age and intervals[235] (Table 23). This phenomenon indicates that the correct immunization schedules or recommended intervals between vaccinations were not followed.[235] This evidence might infer some relation to children being immunized during CHWk and therefore not able to follow timely immunization schedules. There is an epidemiological consequence from this, especially for diseases such as measles which are dependent on very high coverage levels to ensure appropriate population immunity.

Table 22 National aggregate figures for immunization during Child Health Week, 2008
(69 districts)

	June 2008	**November 2008**
BCG	54,817	67,951
OPV3	139,594	55,249
DPT + Hib3	64,598	56,653

(Source: Mwanza, 2009)

Table 23 National fully immunized children, 2–23 months old, Zambia – crude & valid doses (2011)

	Crude (card plus history) (N=1890)	**Crude (card only)** (N=1890)	**Valid doses** (N=1452)
Fully immunized children	81%	63%	22%

- **'Card only'** - Information derived from vaccination cards only.
- **'History'** - Information from mothers' or respondents' recall where health cards were not available.
- **Crude coverage -** Includes the vaccines and their doses recommended in the national immunization schedule regardless whether received before, by or after the recommended age and interval.
- **Valid doses -** Includes those administered as per the national vaccination schedule, respecting the recommended age and intervals for vaccines and doses.

(Source: MCDMCH/CIDA/UNICEF/WHO, Report on Vaccination Coverage Using EPI Cluster Survey, 2011)

The lack of a means to deliver VA and deworming to children under 5 years of age was identified as a critical factor in why it was decided to continue CHWk in Zambia, even though it was discouraged by senior government officials from delivering basic immunization. Thus, CHWk continues, as of today (2016), as it remains an essential delivery mechanism, especially for VAS, as many informants recognized that Zambia was not yet able to deliver VA on a routine basis twice annually for all children up to the age of 5.

6.5.9 An abrupt reduction of Child Health Week

As the reasons behind the decreased focus on CHWk interventions were unclear to many respondents, some informants speculated that there were some efforts to do away with CHWk by senior managers in the ministries as it was believed that it was causing routine immunization coverage to decline.

> *'There is now a shift of focus on the routine, though it is not written on paper. They would like all EPI colleagues to invest their energies into routine. Whatever they were going to be doing for Child Health Week, whether it's money or planning, they need to do it for the routine programme.'* (National health project manager)

Several informants noted that CHWk appeared to draw health workers away from conducting routine primary care services; however, others believed that CHWk was not the cause of the slight decrease in routine immunization coverage. A national-level nutrition expert defended CHWk saying:

> '*It would not be fair to say that Child Health Week was the reason of the weakening of the routine immunization system. It's the weak health system that led the team to use Child Health Week for catch-up.'* (National nutrition specialist, CHTC member)

Despite the various assumptions, the fact that there were no studies to show that CHWk has influenced routine immunization was a source of frustration among both the national and district informants. There was some resentment among six out of 10 respondents at the national level regarding the decrease of this institutionalized strategy that has been conducted in Zambia for over 15 years. The withdrawal of donor funding from the Ministry of Health (MOH) due to the corruption scandal in 2009[205] could also have affected the lack of resource allocation to the districts, therefore resulting in a decline in routine immunization rates. The informants resented the fact that the decision to reduce the strategy to deliver only VA and deworming was made without knowing the root cause of the slight decrease in routine immunization coverage.

This study found that the main trigger that led CHWk to focus only on two nutrition interventions was due to a senior level management decision and view by particular policy makers made in late 2012. The study found that there were high-level consultative meetings at the senior partnership and management levels of the ministries led by MCDMCH to discuss whether the country should continue with CHWk or not, where the notion of staggering levels of routine immunization was discussed. It became apparent that a senior manager was not in favour of CHWk overall. A development agency staff who knew of the situation when the decision was made also explained the view and observance of the senior management regarding the lack of confidence the communities had in the health system:

> *'People don't have confidence in the health system. They say they go to the health centre they don't get anything. They go to the health centre sometimes no health worker is there. They perceive a lack of quality of the services. So this erosion of confidence and credibility of the Ministry of Health is there.'*

The authorities discussed ending CHWk; however, as there was no alternative systematic delivery mechanism to ensure that all children under-five received VAS and deworming, it was decided in a meeting to keep CHWk to deliver only VA and deworming but no other interventions:

'If you don't do the Child Health Week, how do we deliver the vitamin A and the deworming at least? That's why [CHWk] has been whittled down to those two interventions if it really has to stay.' (National health specialist, CHTC member)

Though the proposition that the reason for the abrupt reduction in CHWk was that the health-related ministries found their system to be already strengthened enough to let go of the campaign-mode of delivery, it was basically an attempt by the senior management of the MCDMCH to drastically reduce the campaign mode to strengthen their routine immunization.

6.5.10 Child Health Week as routine

Child Health Week was, and is, a vital opportunity for communities to access essential child health services including basic immunization, and communities expect CHWk to occur twice a year. It was commonly voiced by numerous informants that people have become so used to CHWk that it has become part of their culture. People who live far away from health centres and the 'under-1 clinics' wait for CHWk to come.

'Though they may have a child who is 9 months old and have to go for his measles jab, they wait for the next two months since the campaign is coming then.' (National health ministry staff)

There were also those – not necessarily immunization specialists – who concurred with the need to de-emphasize CHWk as they also noted that it was disrupting routine immunization coverage:

'I think that there was nothing wrong in trying to catch children who missed their vaccination during Child Health Week. Except with time, the emphasis on routine immunization may have been diluted, and this is what we could have avoided.' (National health specialist)

Despite the speculation that the faltering routine immunization coverage may be partly due to CHWk, the consensus among the respondents was not to halt CHWk abruptly but rather to do so in phases, and that re-promoting and re-strengthening routine immunization should be done on a continual basis, even during CHWk. Many informants (R1, R7, R15, R16) believed they should continue with CHWk and focus on VAS and deworming 'until the health system is strengthened' (National nutrition specialist). National-level communication specialists concurred that similar social

mobilization efforts that were made for the overall promotion of CHWk could be emphasized to re-promote routine immunization, as Zambia has done in the past. An EPI specialist suggested that during CHWk social mobilization efforts, mothers of babies who have attended CHWk during the last six months could be reminded to bring their babies for the second dose of measles, for instance, if they haven't received it already. But the specialist realized that this suggestion may also have conflicting implications, and that the same issues may appear where 'children will not be immunized until the next six months until Child Health Week'.

As CHWk became institutionalized, the bi-annual events became self-sustaining except for in-kind donations and some financial support from external partners on tools for social mobilization or in supporting districts with the lowest VA coverage. The awareness of the government to refocus on strengthening routine immunization was likely a positive development for the country. However, sustaining high and extended coverage of routine immunization is not an easy task, especially given the financial and physical constraints placed upon the districts. More research is needed to assess whether there were more resources allocated to the districts for routine outreach since basic immunization was 'eliminated' from the CHWk agenda. Additional operational costs and human resources to conduct routine outreach are necessary for the districts to be able to manage this. Hence, it is essential to ensure the availability of operational funding to the districts and peripheries to strengthen and sustain routine immunization outreach when CHWk is reduced from delivering comprehensive packages.

6.6 Discussion

This study portrays the experiences of a former low-income country, Zambia, which became a long-standing leader in implementing, managing and expanding the multi-component ICHEs, which then attempted an abrupt policy change by rapidly decreasing its emphasis on ICHE-style health services delivery and adopting more of a systems strengthening approach. This particular experience provides new and important lessons for other LMICs and the wider international public health

community as they attempt to transition from campaign-based strategies to strengthening routine immunization.

The potential negative impacts of various ICHEs on broader health systems have been documented,[11,119] and this study is consistent with these findings. In the case of Zambia, the combination of an institutionalized CHWk and the lack of financial and human resources available in the district health management disrupted the adequate provision of routine immunization services. The abrupt policy change made in Zambia was an attempt by senior management in the health ministry to reduce the negative effects that an ICHE strategy may have on the routine immunization system. The senior manager was said to be concerned about the decreasing routine immunization coverage, though there was no actual study to prove this effect. Zambia is no longer low-income country,[170] and it is on target to reach its goal of reducing child mortality.[248] It can be argued that it is timely for such countries to begin building its health systems and addressing structural and periodic gaps rather than relying on disease-focused events. However, altering the system and the behaviour of local actors can be challenging when a well-adapted strategy has been embedded into a society.

Many LMICs still rely heavily on targeted mechanisms to provide many services to their populations, and campaign-style delivery models are considered feasible. However, much of the literature, as well as new emerging practices are starting to focus more on strengthening the health system,[249-254] highlighting the importance of health system strengthening to sustain the continued and timely delivery of already proven disease-focused interventions. This study highlights both the vital role that ICHEs continue to play in delivering essential services in LMICs, while also demonstrating the challenges that come with an over-reliance on such mechanisms, particularly when the country seeks to evolve to a more systems-oriented approach. The findings of this study suggest that LMICs should perhaps transition from targeted approaches only gradually and carefully, and maintain some aspects of campaign-style delivery approaches, such as only for essential vaccines for acute disease-

outbreak preventions and vitamin A, to continue providing life-saving services to remote communities and to avoid losing trust from communities while this transition takes place. At the same time, it is critical to have a strategy for strengthening the overall health system, and in this case, strengthening routine immunization. This 'synchronised' approach of the co-existence of both campaign structure for the immediate term running parallel with a longer-term system structure development coincide with Atun and colleagues' concept regarding the benefits of the co-existence of a targeted vertical delivery strategy with a horizontal system-focused approach.[25]

For example, integrated health events and routine immunization strengthening can be coordinated by the same structure that manages ICHEs and routine services, with it being responsible for both short- and long-term outcomes, rather than different divisions managing campaigns and routine services. In this way, the design and implementation of ICHEs can also be set and monitored for longer-term routine outreach goals.

The decision to hold CHWk should be made by the national level MOH, as they are aware of the epidemiologic needs of whether or not campaigns are needed, especially for disease outbreak preventions. However, the package of interventions should be tailored according to the specific needs of the community. If districts and CHWk teams have the capacity to deliver more services than the priority interventions indicated by the national level, especially to remote areas, then a more comprehensive package of interventions should be delivered as they can take advantage of delivering multiple interventions in one trip, rather than having the communities risk not receiving other child health services altogether. The criteria of conducting CHWk should be based on epidemiological needs; that is, if there is a vitamin A deficiency in the country which requires VAS twice a year, and a measles follow-up campaign is required to maintain herd immunity, then it might be recommendable to conduct campaigns to deliver these essential and selected services until the health system is able to deliver the services through their routine delivery mechanisms. However, the mechanisms for service delivery to the

communities should be determined by the district and health workers, as long as there are sufficient financial and human resources at the district levels to deliver the services.

The findings of the papers lead to the idea that multi-faceted campaigns are extremely useful in remote and rural areas within countries where access and financial and human resource constraints inhibit the delivery of basic child health services on a regular basis. Countries in emergency, war-torn situations also can benefit tremendously from multi-service campaigns. However, in politically stable countries with strong government stewardship, where financial resources are available with sufficient human resources to carry out delivering essential child health services through the routine health system mechanism, countries need to be careful when conducting campaigns. The study suggests that stable, middle-income countries may only occasionally conduct a child health service delivery campaign with two or three interventions to eliminate or prevent a specific disease outbreak. In many countries where routine immunization is strong, routine vaccinations should not be included into campaigns to avoid having communities depend on them to receive those services.

To maintain financial sustainability for both ICHEs and the strengthening of the health system might mean that donors would need to support longer term, less visible but fundamental system-strengthening activities than the flagship campaigns.[242] Numerous global health institutions and international agencies are increasingly finding ways to support HSS through global health initiatives[249-252], which is a promising move towards this synchronized approach discussed here. A too quick and radical move towards HSS has its own dangers. A focus on direct investments in strengthening routine immunization should be made as an integral part of the broader HSS, but without neglecting the campaign model—particularly where it is effective—to ensure that achievements in child mortality reduction are obtained and sustained.

This study exhibited several limitations common to all qualitative research. Most notably, it relied on a fairly small sample of informants, drawing mainly from the national level and from two districts. However, in-depth interviews with individuals with extensive experience in managing and working with CHWk provided profound and comprehensive data that lead to the in-depth, comprehensive understanding of the evolution and contextual situation surrounding CHWk. The study, focusing primarily on the national policy and direction taken by the national level regarding CHWk, led to the predominant focus on interviews at the national level with stakeholders with institutional memory of planning, managing and coordinating CHWk. Triangulating data from several different sources and extensive document review helped to further strengthen the analysis.

6.7 Conclusion

The reliance on the expansion of ICHEs to deliver essential child health services due to country-specific factors has been shown to be both beneficial in achieving results as well as proving potentially harmful to the health system in the long run. Likewise, abrupt transitions away from a campaign-dominated approach to an increasingly health systems strengthening approach need to be managed carefully and resourced adequately in order to maintain health service delivery and coverage levels during the transition while enhancing the potential success of systems-strengthening approaches over the longer term.

Chapter 7. Integrated Child Health Events as a mechanism for delivery of multiple child health interventions: the lessons so far

Discussion and conclusions

7.1 Discussion

Integrated child health events (ICHEs) have evolved in the last decade as a strategy to accelerate the reduction of child mortality through expanding access to cost-effective child survival services in low-income countries.[1,42,74-78] Implementing such campaign-style events has become an established mechanism for funding and delivering essential interventions, offering the potential of achieving a clear and demonstrable impact within a short period of time. ICHEs have been implemented in parallel with the other mainstream models of delivery of key child health interventions, and were never meant to replace them. Nonetheless, in countries where access to health services is problematic and the health system is poorly functioning and lacking capacity, a nationwide campaign outreach approach has continued to be a dominant service delivery strategy aiming to reach as many children as possible and to ensure targets are met.[1,26,28,40-42] However, these pragmatic approaches of delivering multiple interventions to increasing coverage have been hampered by limited evidence of their effectiveness and operation. There have been extensive debates on vertical in relation to horizontal programmes and ways in which they interact, however, vertical programmes are not uniform and vary widely across countries. There is scarce research on how the different modalities within vertical programme facilitate their effectiveness and, at the same time, fit with and strengthen the existing health systems.

The study addressed a range of concerns in relation to integrated child health campaign-style events. The first is that given the increasing popularity of ICHEs, adding interventions may decrease their effectiveness; that is, fail to sustain or increase coverage of interventions. The study suggests that this has not been the case. Adding multiple interventions did not appear to decrease the effectiveness of

ICHEs or hamper the ability to sustain or increase campaign coverage of key interventions. This relationship was indicated across the different intervention packages. While not intuitive, this finding is consistent with other studies which demonstrate that supplementary immunization activities (SIAs)[41,118,155] and child health days (CHDs)[82,151,156,157] contribute to improved coverage of interventions. However, these findings should be interpreted with caution, and it cannot be presumed that further expanding the intervention packages of ICHEs will continue to achieve positive outcomes. The aggregate analysis does not provide any information on the conducive factors and implementation practices that are required to support countries in carrying out their own campaigns. The focus solely on coverage outcomes of vitamin A (VA) and measles—for which data was available in the UNICEF dataset—may not reflect the ability to successfully deliver multiple interventions within ICHEs that may include any other interventions. It has been shown that delivering relatively simple-to-administer interventions such as oral polio drops and VA fare better in terms of coverage outcomes, requiring less skill and time and their delivery procedures are more standardized than other labour-intensive interventions[42,160] such as behaviour change promotion and HIV prevention. However, the study does suggest that adding interventions to established ICHEs may be a viable strategy in resource-poor settings, and can potentially be delivered without a decrease in campaign coverage for VA and measles. In addition, there are spill-over effects, with ICHEs often being an effective vehicle to deliver a wide variety of essential child health services beyond immunization and VA, to large population sections.

This study also showed that that ICHE-based strategies can be highly influenced by sudden or unexpected changes in contextual circumstances, such as altering policy and management structures and unstable funding flows. Given that a majority of vertical campaign events are heavily funded by donors,[250,255-257] there may be particular concerns regarding sustainability of the provision of multiple, uninterrupted health services to the population through ICHEs. Careful review of

both national and global contexts is essential when intending to increase and expand an ICHE-focused strategy.

This leads to the question of how ICHEs, which include multiple interventions, can be implemented within a national health system, and what supportive conditions need to be in place to facilitate the design and implementation of these campaigns. Examining the evolution of Child Health Week (CHWk) campaigns (a variation of ICHEs) in Zambia, a country that has relied heavily on such events, demonstrated that these were shaped by factors within the health system and beyond. The study showed how Zambia was successful in managing CHWk and expanding it. The prominent roles played by the national level government in ensuring the uptake of the various models of health service delivery for their population, along with good stewardship and collaborative partnership-building, emerged as significant factors in the successful expansion of ICHEs. Throughout their long history of managing CHWk, Zambia made adjustments and overcame obstacles that hampered these events (e.g. related to decentralization policies) and built up structures and systems around it.

This study has shown the enormous and vital role that ICHEs continue to play in delivering essential services in the majority of low- and middle-income countries (LMICs) as a means to deliver not only VA and immunization but also other essential child health services. Interestingly, the campaign delivery model has become firmly institutionalized and embedded into the Zambian health system, in effect becoming itself almost routine. For many population groups, campaigns represent their only contact with the health system and an opportunity to receive trusted services. Similarly to Zambia, many LMICs, supported by international donors and national institutions, still rely heavily on ICHEs to expand or sustain coverage of essential services,[23,40,84,258] and vertical approaches continue to be a predominant form of investment in health systems by donors in LMICs.[250,255-257] As shown in the study of Zambia, these models can be gradually embedded in the system and used as a platform to expand other essential services and strengthen systems beyond the narrow scope of the campaigns themselves.

In the context of Zambia, however, decentralization of responsibility to manage these events from the central level to the districts has obstructed rather than facilitated ICHE expansion. What appeared to be decentralized in the management of these events was actually not reflected in practice, as the districts were still instructed by the national level about the type and number of interventions to deliver through the events. Furthermore, the campaigns were seen to have performed better (i.e., higher VA coverage levels) when the national level departments and institutions were leading them. This result is contrary to the expectation that decentralization will enable and empower districts to take control of the delivery of key integrated campaigns and of strategies to attain primary health care (PHC) for all.[259]

At the same time, decentralization in Zambia placed—reportedly—unjustifiable demands on the district governments to sustain and achieve high goals in routine immunization without being given the means to achieve them. Districts' effort to efficiently balance the management of PHC delivery through routine services and multi-component campaigns was constrained due to the lack of financing and human resources allocated to them to manage both these parallel approaches of service delivery. This phenomenon was commonly found in many LMICs undergoing decentralization.[260-262] As seen in other countries such as in Cameroon and Tajikistan, the health staff might be less motivated to perform routine activities and other primary care tasks because of the lack of incentives for routine activities.[263] In Zambia, this led to a situation where the districts had no choice but to make full use of delivering multiple services (immunization and many others) through 'routinized campaigns' – a mechanism that actually worked and was funded – rather than focus on routine outreach delivery of basic child health services.

But what is effective and beneficial in the present, as a means of filling gaps, does not always translate into an appropriate and positive strategy for the future. ICHEs have the potential to undermine the routine provision of basic child health services within the national health system,[119] which became apparent also in Zambia with routine

immunization. The modification of strategy by the Zambian national level management bodies was an attempt to move in the direction of strengthening the health system and reduce the reliance on campaigns that can be potentially damaging in the long run. However, moving away from a familiar strategy that has been ingrained into the society, as the sudden and unexpected change in policy was not easily adopted and accepted by the local actors. The strong community expectation to receive basic child health services through these events further encouraged the districts to provide multiple services through ICHEs. A key lesson learned from the Zambian case is that abrupt, high-level policy changes do not necessarily translate into action at the lower levels. In effect, the study showed a considerable disconnect between the national level's desire to minimize campaign services and the district and health workers' support for multiple-intervention campaigns. A similar situation was observed in Tanzania in relation to the introduction of the Pay for Performance (P4P) initiative led by the national level in 2008,[264] where regardless of the strong commitment by high-level political and management organisations, this was not translated into operational plans and action at the district level. Similarly, the inadequate communication of the reasons of the policy change by the national level policy decision-makers in Zambia to the districts which had planning and operational responsibility for the campaigns, contributed to the reduced commitment at the lower levels of government, thus resulting in the districts not been responsive to the national level's efforts to reduce the strategy. Zambia now faces the challenge of how to deal with managing both the long-ingrained campaign delivery model which meets immediate needs, and the much needed health system strengthening through strengthening renewed emphasis on routine immunization which is critical in achieving and sustaining health goals in the long term.

This poses a critical question for policy-makers on possible strategies for going forward. The most feasible strategy may be to continue to deliver and further refine integrated campaign events to deliver as many essential child health services as possible on a periodic basis. These have proven to be effective in reaching their

target groups and provide quick results, but may negatively affect health system functioning and capacities. An alternative strategy is to invest resources and management capacity in building up systems—more beneficial in the longer term but requiring more time, skills and resources to achieve results—while running the risk of not being able to fully attend to the immediate needs of the population.

With Zambia's move from low- to lower-middle income status (2014[169]), and being on track to reach its goal of reducing child mortality (87/1,000 live-births),[265] there have been efforts to accelerate the further development of the overall health system[233,266,267] rather than continuing to rely on a series of discrete disease-focused events. This study found that Zambia is adopting an intermediate or 'synchronized' approach where the targeted and multiple intervention campaigns which are intended to deliver only a narrow set of services exist side-by-side with plans and activities to strengthening of the routine immunization system. Overall HSS is gaining much momentum in Zambia, especially in routine immunization, where the government is focusing on investing in building up its human resources for health capacity,[233] its supply chain capabilities,[266,267] and re-building its routine immunization system.[227]

It can be argued that a 'synchronized' approach would be beneficial in LMICs whereby campaigns could continue to respond to shortages due to the not fully operational routine services, while at the same time various components of the health system are developed, with the aim of having a well-functioning and reliable health service delivery mechanism. The idea of a synchronized approach is consistent with Atun and colleagues' emphasis on the benefits of synergy of a targeted vertical delivery strategy with the horizontal system-focused approach.[25] This strategy also suggests that there is no clear dividing line between vertical targeted campaign approaches and system-wide strengthening approaches; in practice they overlap and coexist.[10,256,268] Many governments and international donors now recognize the need to ensure that vertical targeted approaches are consistent with HSS approaches,[249-

[252] and highlight the negative effects of disease-focused targeted approaches that can undermine local health systems and create adverse incentives.

Thus, this thesis demonstrates that vertical and horizontal approaches are not mutually exclusive, but can co-exist and mutually enrich each other. Over time, the focus of delivery can shift in the direction of either approaches, according to resources and political support available at the time. Increasingly research is eliciting a range of strategies to strengthen routine immunization,[269-271] for instance, while slowly transitioning away from campaign-mode of service delivery.[102,272] The optimal scenario, as suggested by this thesis, may be to transition away from targeted approaches to a more comprehensive HSS approach gradually and reflexively, in order to avoid a loss of trust among the local health system actors and communities and to continue to provide life-saving services to remote and excluded populations, while this change process takes place.

7.2 Recommendations

The following policy recommendations are presented and linked to the main components of the conceptual framework. Further summary is provided in Box 1.

Strategy design. National health strategies targeting immediate, urgent needs through ICHEs, while investing in longer-term routine immunization system at the same time, need to be carefully planned in each country. The sequencing of the activities during the transition from campaign-based towards predominantly routine-based delivery is important. For instance, the same coordinating body accountable for campaigns should also be accountable for long-term outcomes**,** rather than different departments managing multi-interventions campaigns and routine immunization services (Box 1). Such an approach would ensure that, in the short term, programme objectives and efficiency are not compromised while the scale of operations is gradually expanded through a strengthened routine immunization system.

Communication. Sensitization and health education regarding the benefits of timely immunization can coincide with the campaigns in a way that strengthens, rather than undermines, the routine immunization system. For example, every time a child goes to the health facility during an event and gets vaccinated, the caregiver can be told which vaccine was given and when they need to come to the health facility for the next consecutive vaccination.

Management. It could be argued that the decision to hold nationwide CHWk is best made by the national level health ministries, as studies suggest that this is where much of the technical capacity is located. For example, national level specialists at MOH, with the support of international technical agencies, may have access to data sources and dedicated resources to collect and analyse data. They can therefore make decisions on when to conduct nationwide or area-specific campaigns to eradicate or control disease outbreaks, or to conduct vitamin A supplementation campaigns for high levels of VA deficiency in the population of children under-five. However, this may not be always the case. If districts have the financial and human resource capacity to deliver services beyond the priority interventions indicated by the national level planners, then the districts are in a better position to decide whether to deliver a more comprehensive package of interventions, especially to remote areas, during these campaigns. Providing districts with such an opportunity may allow them to take advantage of the multi-component campaigns, to avoid the risk of remote communities not receiving essential child health services.

Service delivery. Delivering multiple interventions in a manner that does not undermine routine immunization strengthening is recommended. However, the package of interventions, especially for remote and hard-to-reach areas, should be tailored by the districts according to the specific resource levels in the health system and the needs of the community. Communities that tend to be rural and cut off due to geographic or environmental factors need to be provided with as many services as possible. In some extreme cases—for example, fragile countries (i.e. emergency

states)[23,273]—it is recommended to provide as many comprehensive services as possible to the communities through ICHEs as it would be very difficult for them to access these services otherwise.

However, for the remaining communities, ICHEs could be structured according to the epidemiological need of controlling disease outbreaks, and focus only on interventions that require a campaign-style model to reach the population. Additionally, in countries where routine immunization is high, stable or rising, the study suggests that catch-up vaccinations are better not be included in campaigns to avoid communities depending on ICHEs to receive those services. It is also fundamental to ensure that the campaigns run for a predetermined time-span, and to have an exit strategy or plan for the gradual transition towards a steady routine immunization system development.

Financial and human resources. In order to support both the management of campaigns as well as delivery of basic child health services on a routine basis, sufficient human and financial resources to implement both of these strategies should be provided to the national and especially district-level implementing structures. This may constitute a challenge given the context of lack of human resources for health and inadequate resource allocation for district health management in many LMICs in sub-Saharan Africa, but this requirement can be used as a basis for negotiations with national institutions and donors to ensure the gaps are filled.

There are also concerns about the financial sustainability of ICHEs and balancing resources, given the unpredictability of the governmental and donor levels of resources. Investing in child health campaigns while supporting the strengthening of the routine immunization system, means that donors would need to support less visible routine activities, perhaps to a greater extent than the more visible vertical campaign approaches, as argued by Steinglass.[242] Routine immunization reportedly receives little attention from donors[242] and does not attract the resources needed;

and often donors seek a more rapid return on investments to keep in line with institutional mandates and short political cycles.[242] In order to transition effectively and sustainably between entrenched campaign-mode delivery to routine outreach mode, districts and local governments must be assured of sustained funding, additional health workers and political commitment to policy change[242,269,274-276] before doing away with vertical, targeted strategies.

Box 1. Recommendations for synchronized management of campaigns and routine immunization strengthening *(a summary)*

1. **Strategy design:** Designate a consolidated managing body equipped with a coherent plan, working in coordination with other major stakeholders, and ensure that the management team it is accountable for both short-term campaigns and long-term strengthening of routine immunization goals.
2. **Communication:** Sensitise and remind the community during campaigns of the importance of obtaining vaccinations regularly according to the immunization schedules.
3. **Management:** For epidemiological purposes, the decision to hold nationwide ICHEs is best made by the national level health ministries, while the districts are in a better position to decide whether to deliver a more comprehensive package of interventions during ICHEs, especially to remote areas.
4. **Service delivery:** Tailor the package of interventions delivered during ICHEs to the specific needs of the community, and gradually reduce reliance on ICHEs as access to basic child health services and routine immunization improves.
5. **Financial and human resources:** Ensure there are sufficient human and financial resources to support the delivery of added interventions and for conducting routine outreach delivery of basic child health services at the district levels.
6. **Synchronization:** Balance resources for ICHEs and routine service delivery, in the short and in the long run, while ensuring the transition from campaign-based to routine delivery is part of an explicit plan and effectively communicated to all actors.

7.3 Limitations

The study has a number of limitations. In the quantitative analysis, the study analysed outcome coverage of only VA and measles vaccination due to the lack of coverage data of other interventions delivered through ICHEs. Extending the analysis to other interventions' coverage, especially those of behaviour change promotion and young child feeding and hand-washing, may have helped obtain a more robust

analysis of the association between the number and nature of the interventions and coverage levels. Given the cross-country nature of the analysis, contextual factors could not be considered, though they are expected to play a major role in achieving coverage.

Furthermore, additional measles coverage data points could not be incorporated into the dataset (as noted earlier in Paper 1), though additional measles SIAs may have occurred, as the quantitative analysis was based on UNICEF's CHD database. Thus, the small sample size for measles vaccine-related analysis was a limitation. However, it is important to note there was a consistency in high coverage obtained for both measles vaccines and VA throughout the campaigns, regardless of the sample size.

The qualitative analysis relied on a relatively small sample size, particularly at the district level where respondents were selected from only two districts. This was a limitation, as the experiences across districts are likely to vary significantly. However, the focus of the study was to examine the nation-wide CHWk strategy from a historical perspective, through the lens of the national level policy design and implementation. Efforts were made to select key informants from a variety of institutions with diverse profiles, where the district respondents with extensive experience in implementing CHWk provided a different perspective complementing the accounts of the national level stakeholders, including sharing more vivid details of the district and health facility-level practices. Obtaining data of past CHWk events posed challenges related to recall bias; however, the use of documentation from development partners and the government, aimed to verify and triangulate the information obtained from the interviews.

7.4 Contributions

While recognising the study limitations, the findings provide new evidence to further the debate on health systems and targeted interventions. This analysis showed, for the first time, that a multi-component ICHEs delivered globally do not appear to constrain coverage. It portrayed the breadth of ICHEs, which not only validated the

prominent existence of the strategy, but also exemplified the importance of campaign-mode of health service delivery in LMICs. While the initial quantitative analysis was not able to account for contextual factors, it demonstrated that ICHEs are an effective platform to deliver multiple interventions without compromising outcomes of key interventions. Though VA and measles vaccination may not be representative of all other interventions delivered through ICHEs, this analysis is nonetheless promising and points to the need for more research to deepen and extend the analysis to examine the effect of delivering other more complex interventions through ICHEs.

The study offered an evolutionary perspective on the implementation of an important basic child health service delivery strategy (ICHE) which is highly prominent in LMICs, but is often undocumented in practice. Through the Zambia case study, it assessed the evolving implementation approaches of ICHEs over time, rather than at one point in time, as commonly found in the literature, thus providing an in-depth understanding of the country-specific CHWk evolution. By providing insights as to the nature of implementation challenges, these findings can help health policy-makers and practitioners in LMICs to plan ahead and identify challenges that can be addressed through feasible strategies, and perhaps thereby limit adverse impact in implementation, for example, as creating health systems operating permanently in a campaign mode.

The implementation research framework developed through this study can also contribute to understanding and evaluating the functioning of (vertical) programme interventions in the context of national and district health systems that are often under-resourced and in a flux of reforms. The intention is that the framework can inform pragmatic research approaches and tools that can be embedded into practice and used by planners and implementers to identify key opportunities and constraints related to the implementation of broad based health campaigns in LMICs. This could be further developed by identifying specific action research linked to the conceptual

framework for ICHE programmes (e.g. on data collection, quality of services, human resource development, etc.)

The study demonstrated that the conceptual framework for understanding the implementation research adapted for this study, is missing an important element, specifically the 'stakeholder perspective'. This reflects a growing work conceptualising 'people-centred' health systems[277]. Within this paradigm, Adam and de Savigny[278] have argued that people—policy makers, providers, managers, users—are the central catalyst for ensuring that formal health systems structures and resources function as intended. This study demonstrated that stakeholders made all of the important decisions shaping CHWk in Zambia, for example, by enacting, setting rules and allocating resources as national level policymakers; by coping with and/or subverting to those rules as district health managers and health service providers; and by adapting interventions to local social norms of the communities when working at local level. These decisions were both proactive but also reactive, a result of perceptions and relationships. For example, there was a particular dynamic between policy makers and managers at regional and national levels, in terms of power, programme design and access to resources, and between government health officials and donor representatives over the balance of campaign-driven and routine immunization. These were all critical issues which were shown to influence the shape and form of the CHWk, their operation and evolution. Thus the decision to scale back the CHWk after 2013 was a result of perceptions of senior managers at national level rather than evidence-driven; understanding the motivation, reasoning and priorities of key stakeholders is critical for learning from the implementation of CHWk and of the ICHE campaigns more broadly. Thus, as a result of this analysis, a revised ICHE conceptual framework including 'stakeholder perspective' is proposed (Figure 30).

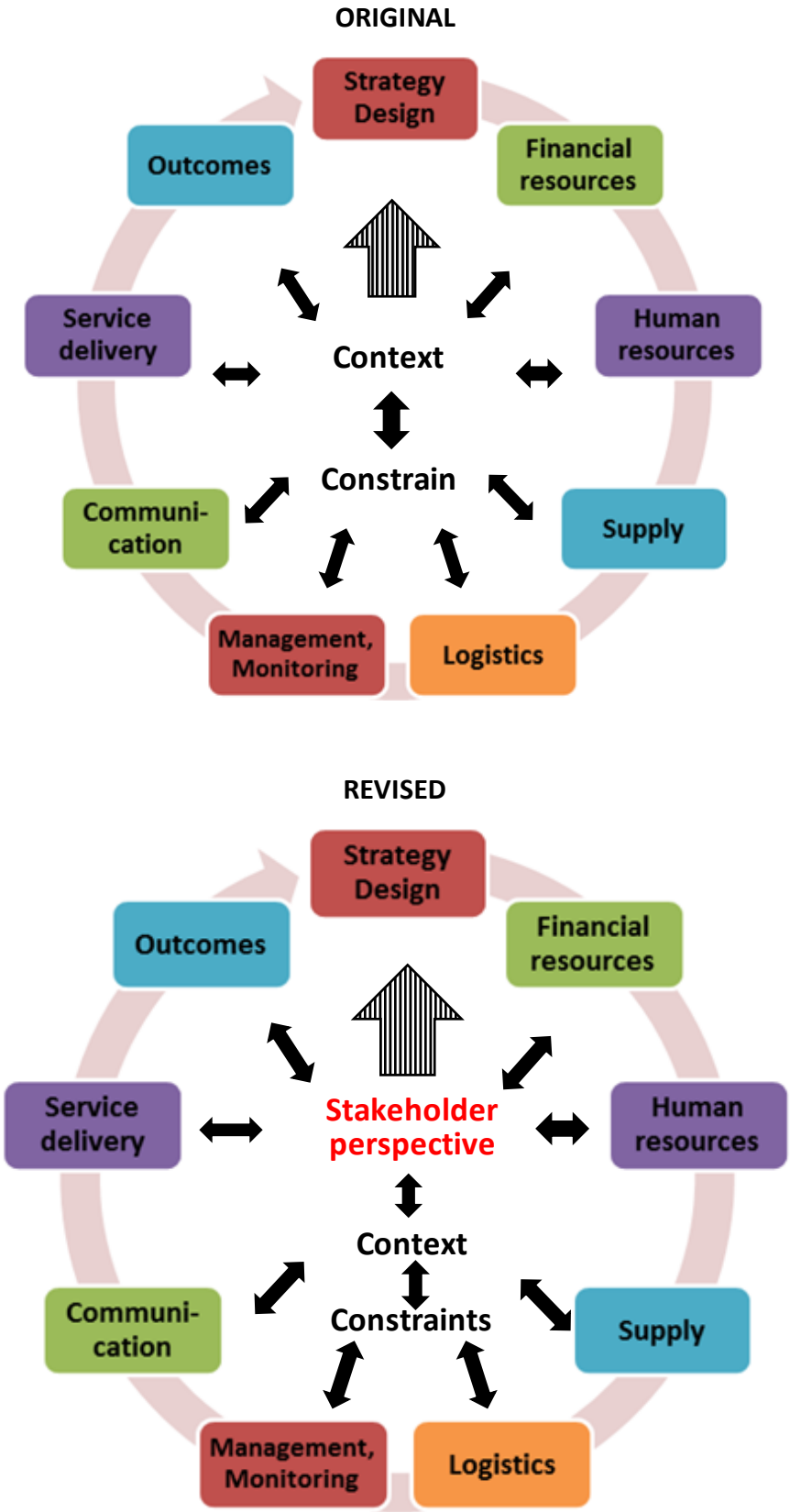


Figure 30 Original and revised conceptual framework for understanding ICHE implementation

The study also contributes to the literature and debates on how to improve health outcomes in LMICs while promoting routine immunization system strengthening. It portrays the experiences of a former low-income country, which became a long-standing leader in multi-component ICHEs, and then sought to implement policy change by rapidly moving away from campaign delivery mode to re-orientate towards a routine immunization strengthening approach. This particular experience provides lessons for other LMICs and the wider international public health community as the country continues to grapple with the critical issue of when, and especially *how*, to transition from campaign-based strategies to routine immunization strengthening approaches in a manner that optimizes rather than harms the health system in the intermediate and long term.

7.5 Further research

The study demonstrated a gap in the literature with regard to the balance between vertical and horizontal programmes and their modalities. Quantitative analysis of the impact of different service configurations within multi-component campaigns is critical, as well as obtaining and combining data sets that can support such research. There is a need for more case studies of countries at a similar stage of health system development, with comparable campaign experiences (e.g. Ghana, Uganda, Zambia) to better understand the extent and nature of the co-existence of the campaign and routine immunization strengthening approaches, and the reasons for the emerging delivery designs. These studies could potentially use a common methodology and analysis, based on suitable theoretical frameworks, and probe deeper into the implementation challenges and enabling factors for successful upholding of multiple-intervention ICHEs and balancing that of routine immunization system strengthening. These country case studies would allow comparisons among countries and programmes, generating evidence that has relevance beyond one country. Importantly, further research is also required to provide an in-depth understanding of the contexts and conditions under which a more integrated campaign-based strategy may be appropriate, and conversely, where it may not be suitable given

potential negative impacts on sustainable and well-functioning routine immunization systems over the longer term. More evidence is needed to learn how these two models can be balanced to maximize each other's strengths, ensuring that essential health services are delivered in a timely manner, but not at the expense of inflicting damage to the routine immunization system.

7.6 Conclusions

ICHEs play a major role in delivering multiple essential child health interventions to remote and vulnerable groups in many LMICs, and have been shown to be an effective strategy for achieving major advances in coverage and health outcomes, at scale. Implementing multiple-intervention campaigns is feasible and effective provided there is strong institutional support, political will and managerial capacity both at national and subnational levels. Recognizing that the popular ICHEs have the potential to both undermine or enhance routine delivery of services, LMICs need to focus on achieving the optimal balance between the delivery of basic child health services through ICHEs and routine service delivery such as routine immunization. Moreover, the development of a fully functioning health system in the long term is likely to require a gradual transition from predominantly vertical to horizontal delivery of essential services; transition that has to be carefully planned, managed and communicated. However, given the acute gaps in the health systems of many low-income countries, ICHEs will continue to have a role but can be used as a platform to strengthen routine delivery of basic child health services guided by a unified health systems development strategy.

Appendices

Appendix 1 Data variables of UNICEF CHD database

(UNICEF, 2013)

Each event on UNICEF's CHD database had information on the year, the region and country, type of delivery mechanism, coverage information for vitamin A (VA) supplementation and measles, and types of interventions that were delivered. Interventions included were: VA, immunization, different antigens (i.e. measles, polio, tetanus toxoid), deworming, distribution or retreatment of insecticide-treated nets (ITNs), growth monitoring (GM), water, sanitation and hygiene (WASH), behaviour change communication (BCC) and 'other services'.

VARIABLE	VARIABLE LABEL	VALUES
country	Country name	string
region	UNICEF regions	1 CEE / CIS 2 East Asia & Pacific 3 Eastern & Southern Africa 4 Middle East & N Africa 5 South Asia 6 The Americas & Caribbean 7 Western & Central Africa
sem	semester	Range: 1-24
year	year	Range: 1999-2010
date	month(s)	String
mech	Delivery mechanism	1 Child Health Days 2 Measles SIA 3 Ongoing Routine 4 Other 5 Polio NID/SNID
vita	Vitamin A supplementation	0=No, 1=Yes
imm	Immunization	0=No, 1=Yes
routine	Routine immunizations	0=No, 1=Yes
opv	Oral polio vaccine	0=No, 1=Yes
mcv	Measles-containing vaccine	0=No, 1=Yes
tt	Tetanus toxoid	0=No, 1=Yes
othant	Other antigen	0=No, 1=Yes
dw	Deworming	0=No, 1=Yes
itn	Insecticide-treated nets	0=No, 1=Yes
gmp	Growth monitoring & promotion	0=No, 1=Yes
wash	Water, sanitation & hygiene	0=No, 1=Yes
bcc	Behaviour change communication	0=No, 1=Yes
cov_vita	vitamin A supplementation coverage	Range: 0-100
cov_routine	EPI catch-up coverage	Range: 0-100
cov_opv	OPV coverage	Range: 0-100
cov_mcv	MCV coverage	Range: 0-100

cov_tt	TT coverage	Range: 0-100
cov_othant	Other antigen coverage	Range: 0-100
cov_dw	Deworming coverage	Range: 0-100
cov_itn	ITN coverage	Range: 0-100
cov_bcc	BCC coverage	Range: 0-100
cov_oth	Other intervention coverage	Range: 0-100
comp	count of interventions included	Range: 0-8
Svytype	Numerous names of surveys used	
tot	Total count of interventions (including different antigens)	0-11

Appendix 2 Sample of revised CHD database

code	country	region	year	sem	source	date	mech	vita	imm	routine	opv	mcv	tt	ant	dw	itn
GHA	Ghana	Western & Central Africa	2006	16	VAS + JRF	Nov	Child Health Day	1	1		1	1	1		1	1
GHA	Ghana	Western & Central Africa	2007	17	VAS	May Only	Child Health Day	1	1						1	1
GMB	Gambia	Western & Central Africa	2007	18	VAS + JRF	Nov-Dec	Measles SIA	1	1			1			1	0
GMB	Gambia	Western & Central Africa	2008	20	JRF	11/17/2008	Child Health Day	1							1	
MDG	Madagascar	Eastern & Southern Africa	2007	17	VAS	Apr Only	Child Health Day	1	1						1	1
MDG	Madagascar	Eastern & Southern Africa	2007	18	VAS	Oct Only	Child Health Day	1	1			1			1	1
MDG	Madagascar	Eastern & Southern Africa	2008	19	VAS + JRF	Apr Only	Child Health Day	1	1	1		1	1		1	0
MDG	Madagascar	Eastern & Southern Africa	2008	20	VAS + JRF	Oct Only	Child Health Day	1	1						1	1

gmp	wash	bccsp1	other	Othsp1	cov_vita	cov_opv	cov_mcv	cov_tt	cov_dw	comp	svytype	svyyr	tot
1	0		1	birth registration	85	84	79	92	65	6	MICS3	2006	9
1	0		1	birth registration	77					6	Standard DHS	2008	6
0	0	0	0		93		96		92	3			3
		0			93				83	2			2
0	0		0		100					4	Standard DHS	2008	4
0	0		0		100					4	Standard DHS	2008	4
1	1	Breastfeeding promotion	1	birth registration	100				75	7	Standard DHS	2008	9
1	1	Breastfeeding	1	birth registration	97					8	Standard DHS	2008	8

Appendix 3 Child Health Days analysis by Palmer et al.

Palmer and colleagues have conducted an analysis of the global situation of CHDs in another paper using the original UNICEF CHD database.[1] They have analysed the global situation of CHD and considering events that were coded as CHD. SIAs and NIDs were not included in their analysis. Table 24 compares the UNICEF original CHD database used for their CHD analysis and the ICHE database used to conduct the ICHE analysis.

Table 24 Comparison of the UNICEF CHD database and the ICHE database

		ICHE database	Original CHD database
Total number of events analysed	**1999-2010**	--	542
	2005-2010	597 (577 – with vitamin A data; 142 – with measles data)	474
Number of countries included		73	72
Range of number of interventions		2 to 11	2 to 9
Campaign types analysed		• Child Health Days • Measles Supplementary Immunization Activities (SIA) • Polio National Immunization days (NID)	Child Health Days (CHD)
Number of intervention packages		188	82

*CHD Analysis: Palmer et al., 2013[1]

Appendix 4 Countries analysed in ICHE database, by regions

Total countries 73

*CEE/CIS = Central & Eastern Europe / Commonwealth of Independent States

East Asia & Pacific	Eastern & Southern Africa	Western & Central Africa	South Asia	The Americas & Caribbean	Middle East & North Africa	CEE / CIS*
Cambodia	Angola	Benin	Afghanistan	Belize	Djibouti	Kyrgyzstan
Cook Islands	Botswana	Burkina Faso	Bangladesh	Bolivia	Iran, Islamic Republic	Tajikistan
Fiji	Burundi	Cameroon	Bhutan	Dominican Republic	Jordan	Uzbekistan
Indonesia	Comoros	Central African Republic	India	Ecuador	Lebanon	
Kiribati	Eritrea	Chad	Maldives	Guatemala	Sudan (north & south)	
Korea, Democratic People Republic	Ethiopia	Congo	Nepal	Haiti		
Lao, People Democratic Republic	Kenya	Congo, Democratic Republic	Pakistan	Honduras		
Marshall Islands	Lesotho	Côte d'Ivoire		Nicaragua		
Micronesia	Madagascar	Gabon				
Mongolia	Malawi	Gambia				
Myanmar	Mozambique	Ghana				
Papua New Guinea	Namibia	Guinea				
Philippines	Rwanda	Guinea-Bissau				
Timor-Leste	Somalia	Liberia				
Viet Nam	South Africa	Mali				
	Swaziland	Mauritania				
	Tanzania	Niger				
	Uganda	Nigeria				
	Zambia	Sao Tome & Principe				
	Zimbabwe	Senegal				
		Sierra Leone				
		Togo				

Appendix 5 Interview guide

(Questions in **bold** were the main questions to ask.)

PERSONAL BACKGROUND & EXPERIENCE (General, easy questions)

1. What is your daily task? Job?
2. Have you participated in CHWk before? In what year? Which round?
3. How many CHWks have you experienced so far?
4. **Could you walk me through what your organization does to prepare for CHWk?**

STRATEGY DESIGN – Planning, strategy, coordination

1. Which department/sectors were involved in that particular CHWk?
2. How is that determined?
3. Which department in MOH led the organization of the event? (i.e. immunization, malaria, child survival, etc.)
4. * Any issues with which ministry lead the coordination group?
5. What did the international organizations do? Which organizations were involved?
6. **How was the planning different from CHWk that delivered 10 interventions in comparison to the one that delivered five, for example?**
7. Or was there a standard protocol made at the national level that all districts followed?
8. Did all districts deliver the same services?
9. **How was it decided to take away or add an intervention?**
10. **What were the reasons for the addition/deletion?**
11. Are there too much interventions delivered at once?
12. How many more services would be good to add to one CHWk event?
13. What is a good number of interventions to deliver?
14. **Were there any issues with having so many interventions?**
15. **How were the issues solved?**
16. **What should happen the next round, in terms of types and number of interventions delivered?**

FINANCIAL RESOURCES

1. How much funding was needed to organize that particular CHWk?
2. Where did the funding come from?
3. **How are the funds dispersed to and in the district level?**
4. *How were the funds accounted for, especially when paying incentives at the community levels?
5. **Was there a gradual process of financial handover and ownership to the government, or is it very donor financed?**
6. **What were the constraints in financing more services delivered?**

HUMAN RESOURCES

Training/Orientation:

1. What kind of training/orientation took place prior to CHWk? Once/twice a year?
2. How many days of training did it take?
3. **Did the increasing number of interventions affect overall training?**
4. How was the training quality, length and content?

***Incentives:**

5. Were the personnel paid to conduct tasks in CHWk?
6. How many days/hours per day/weeks are spent on preparing or monitoring CHWk?
7. **Did more services delivered mean more incentives were needed?**
8. **Any complaints/issues regarding incentives with high number of interventions delivered?**
9. Who received incentives to work in CHWk?
10. Were there other types of incentives, such as travel money for training? For carrying loads of materials back to the health centres?

Overall job load/personnel:

11. **Did working for CHWk take away from other daily tasks that were carried out?**
12. How were community workers recruited? What motivated them to collaborate in CHWk?

LOGISTICS & SUPPLY

1. Did the supplies arrive early enough to have enough time to prepare? At national, district & community levels?
2. **Which service supplies were the most difficult to handle?**
3. How are those kinds of issues solved?
4. Which intervention due to logistics constraints is the most burdensome and should be taken away for the next round?
5. **How did the physical delivery of supplies differ with high number of interventions?**

MANAGEMENT AND REPORTING

1. **How did the reporting of multiple interventions coverage take place? Any issues on this?**
2. How long does this feedback take place?
3. How does feedback get back to the coordinating team about possible problems found in implementation?
4. How were the different types of services coverages reported?
5. **How was the differentiation of beneficiaries distinguished between those who receive and not receive certain services? Was this further complicated by the high volume of interventions delivered?**
6. How do the workers identify the ages of children?

COMMUNICATION

1. How is the CHWk usually advertised to the people?
2. What communication channels worked best?
3. **How are the communities aware of the more number of services delivered?**
4. **Did the increasing number of interventions mean more messages were sent out of the community?**
5. How did feedback from the communities reach national levels?
6. **How are bottlenecks reported back, to make necessary adjustments?**

SERVICE DELIVERY

1. **Why were some interventions eliminated, while others not?**
2. **Which service provided the most difficult to provide?**
3. **Was there any reluctance from the communities to receive certain kind of service?**
4. Which services were the most appreciated?
5. **How about adding more interventions?**
6. Were there any problems in delivering some interventions to certain age groups, while not others?

OUTCOMES

1. What were the outcome coverage of each intervention? (not to be asked in the interview)
2. Is there an updated national census (population count)? Where are baseline/ population denominators obtained to calculate the target population?
3. **What happens to the routine delivery of services?**
4. Are you content in conducting CHWk? Why and why not?
5. **How is CHWk perceived by the Government? Donors? Communities?**

CONTEXT

1. How is the Ministry of Health situated within the context of Zambia?
2. Health system situation?
3. How is the MOH structured?
4. Who is the overall manager of CHWk?

FUTURE

1. What next?
2. **What would be best to happen to CHWk next year?**
3. **What would have happened without CHWk?**
4. **What are your recommendations to other countries?**

Appendix 6 Information sheet

Study Title: Accelerated delivery of targeted child survival interventions through integrated Child Health Events

Principle Investigator (PI): Mahoko Kamatsuchi

Email Contact of PI: mahoko.kamatsuchi@lshtm.ac.uk; mahokok@yahoo.com

PI mobile: +1 647 920 2010

Objectives of the Study: The principle investigator (PI) is a doctoral student of public health at the London School of Hygiene and Tropical Medicine. The PI is currently conducting research to obtain her doctoral degree qualification.

The aim of the research is to analyse and understand the factors which determine the successes and failures of a Child Health Weeks (CHWk) to achieve its objectives. It aims to provide programmatic recommendations for change or lessons to adopt by other countries to effectively implement large scale CHWk events that attempt to deliver high number of health and nutrition service interventions. The PI will elaborate a doctoral report, articles for dissemination, and conduct presentations to the wider public at the end of the study.

Participation: Your participation in this study via interviews is entirely voluntary and you may withdraw at any time without reason. If you choose to take part in this study, you will be asked to sign a consent form and will be interviewed by the PI. If you agree, the interview may be recorded. You may choose not to have the interview recorded and still participate. You may be asked for a second interview. You may decline this second interview without reason.

Risks: You may stop the interview at any time or decline to answer any questions. If you would like, you may speak to the PI's advisor at the London School of Hygiene & Tropical Medicine, Dr Dina Balabanova (+44 20 7927 2104, Dina.Balabanova@lshtm.ac.uk), Dr Nilda Lambo at UNICEF Zambia (0211 374 200, ext. 2075, nlambo@unicef.org) and Mr Mwanza at the National Food & Nutrition Commission (097 915 8899, mmwanza@nfnc.org.zm) for any further inquiries.

Benefits: You and your office will have access to the final report of the study. This study may help identify strengths and weaknesses of your current programme implementation of CHWk that may benefit the women and children in the country, as well as help you perform more efficiently and effectively in the next round of CHWk. This study may also benefit the country of Zambia to disseminate widely the high achievements of the efforts already made in the programme implementation of CHWk.

Confidentiality: The PI will be responsible for confidentiality. She will keep all records and consent forms in a secure area. No one but the PI will be allowed to see the records. The research data will be kept 10 years after the completion of the study, including consent forms and collected data such as interview recordings, notes, and other relevant data gathered. All information will be kept anonymous and confidential unless the participants authorize the PI that she may use the information in her report.

Compensation: You will not receive any compensation for participating in this study. Your participation is completely voluntary.

Approvals: The ethics committee at the London School of Hygiene & Tropical Medicine (LSHTM) and University of Zambia Biomedical Research Ethics Committee (UNZAREC) (0211-256067, or unzarec@zamtel.zm) have approved this study.

Appendix 7 Consent Form

Study Title: Accelerated delivery of targeted child survival interventions through integrated Child Health Events

Principle Investigator (PI): Mahoko Kamatsuchi
PI E-mail Contact: mahoko.kamatsuchi@lshtm.ac.uk; mahokok@yahoo.com
PI Mobile: +1 647 920 2010

I have read the information sheet concerning this study and I understand what will be required of me and what will happen to me if I take part in it. My questions concerning this study have been answered by Ms Mahoko Kamatsuchi at LSHTM, and I will inquire further to Dr Dina Balabanova at LSHTM, Mr Mofu Musonda or Mr Mike Mwanza at National Food & Nutrition Commission or Dr Nilda Lambo at UNICEF when necessary. I understand that at any time I may withdraw from this study without giving reason and without affecting my normal work and management.

I agree to take part in this study

Yes_____ No _____

I agree that any information from my interview may be used in this study

Yes_____ No _____

I am aware that I will not be mentioned by name in this study, but my role in the implementation of Child Health Weeks may be mentioned.

Yes_____ No _____

I agree that my interview may be tape-recorded

Yes_____ No _____

Signed_____

Date_____

Appendix 8 Key search terms and online search resources

Key search terms:

child health day*
integrated child health event*
maternal adj3 (child health day*)
outreach
outreach program*
expanded outreach program*
supplementary immuni#ation activit*
campaign*
child survival intervention*
measle* OR measle* adj3 OR adj5 (vaccinat* OR immune* OR antigen*) OR MCV

Online search resources

MEDLINE/PubMed
EMBASE
Global Health
Web of Science
Cochrane Library
HEED
Popline
Africa-Wide Information
IMEMR
IMSEAR
WPRIM
BASE
Dissertation Abstracts
EDLIS
Intute
Journal Citation Reports
Film & Sound

Appendix 9 List of components and codes (NVivo)

*Components and parent codes/nodes are in **bold** and listed in alphabetical order

Administration	**Human resources**	**Quotes**
Decentralization	Incentives	**Recommendations countries**
District implementation	Orientation	**Services**
Targeting	Overall job load	Bednets
Communications	Personnel	Deworming
Messaging	Turn-over constraints	Family planning
Sensitizing	**Key questions**	GMP
Targeting	**Logistics Supply**	Health education
Community	Logistics	HIV testing
Constraints	Supply	IMCI
Challenges	**Outcome**	Immunization polio
Communication constraint	Monitoring & evaluation	Lots of services
Distribution constraints	Denominator problems	Measles campaign
Hard to reach	Feedback	OK to increase many interv
Ministries changes	Feedback from field	Routine immunization
No supplies for routine	Reporting	Vitamin A
Quality decrease	Routine imm effect	WASH
Shortage of staff	High imm cov low routine	
Waiting time	Killing routine	**Thoughts on CHWk**
Context	Missed opportunity	Actual CHWk
Corruption issues	Not due to CHWk	CHWk institutionalized
District situation	Opportunity for no resource	Became routine
Institutional conflict	Outreach	Recommendations for new CHWk
Financial resources	Solution	Toning down of CHWk
District finance problem	Studies for verification	Best experiences
Financial flow constraints	Vitamin A results	Cons
Future	**Strategy Design**	Continue
Next CHW	Coordination	History of CHWk
Routine immunization	Partners	Pros More interventions
Suggestions to fund-raise	Decision making	Cost effective
Health system	Contradictory policies	Strengthen routine
Community Health Assistants	Manuals documents of interest	Stop it
	Planning	What happen wo CHWk
	Date-setting	Worst experiences
	Decision interventions	
	District planning	
	Strategy	
	Piloting	

Appendix 10 Type of measles supplementary immunization activities (SIAs)

(from WHO, Measles SIAs Field Guide, 2006)

The different types of measles supplementary immunization activities (SIAs) include:

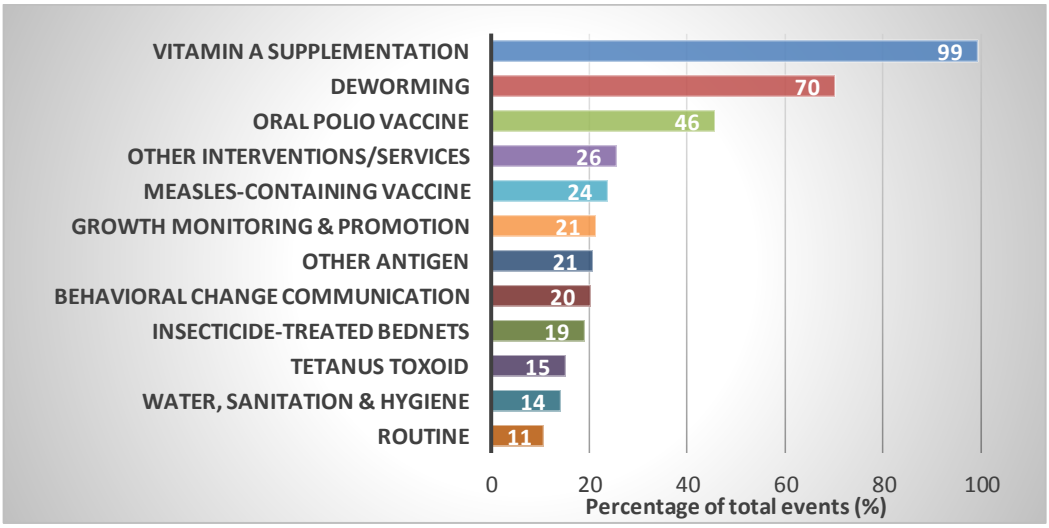
- **'Catch-up campaigns':** One-time events to vaccinate all children under the age of 15 years. Children aged 9 months to 14 years are targeted since more than 90% of measles incidence takes place in this age group. Here, the purpose is the reduction of susceptible children in a population.

- **'Follow-up campaigns':** Periodic mass immunization campaigns every two to four years following 'catch-up' campaigns whose purpose is to reduce susceptibles born since the previous SIAs. The timing of follow-up SIAs is determined by the speed of accumulation of susceptible depending on routine immunization coverage and the coverage during preceding catch up or follow-up SIAs. Therefore, the lower the routine immunization coverage, the shorter the interval between campaigns.

- **'Mop-up campaigns':** House-to-house visits to find children who have missed both routine and previous mass months' campaign events that target the whole country or large regions and aim for >90% coverage.

Appendix 11 Key child health & nutrition interventions co-delivered during ICHEs (2005–2010)

(Out of a total of 597 events)



Percentage indicators show how frequent the intervention appeared in the total number of events shown in the merged database.

*__Other interventions__ are listed in Appendix 5.

**__BCC__ includes behaviour change communication message promotion regarding breastfeeding, diarrhoea prevention, HIV/AIDS awareness, consumption of iodized salt promotion, neonatal care, nutritional screening, birth registration, maternal health care, among others.

Appendix 12 Other Interventions co-delivered during ICHEs, 2005–2010

Intervention	Target Population
• Nutritional screening/referral	0–5 years
• Iron folic acid supplementation	Pregnant women
• Birth registration	Newborns
• Family planning	Women of reproductive age; men
• Post-partum VA supplementation	Breastfeeding women
• Intermittent preventive malaria treatment	Pregnant women
• Micronutrient powders	Children 1–5 years
• HIV testing or counselling	Pregnant women
• PMTCT	Pregnant women
• Community-directed treatment with ivermectin	Community members
• Integrated management of childhood illnesses (IMCI)	Caretakers; mothers
• Salt testing kits for iodine	In iodine deficiency endemic areas
• Iodized oil distribution	In iodine deficiency endemic areas
• Noma and burili ulcer research	--
• Post-natal consultation	Breastfeeding women
• Screening for eye disease	Community members
• Cotrimoxazole refill for HIV-exposed children	--
• Counselling (un specified)	--
• Tuberculosis screening	Community members

Appendix 13 List of packages in ICHEs, 2005–2010

Packages delivered (in order of most common)

Package	Frequency	Proportion of total packages (n=188)
vo	61	32%
vod	51	27%
vd	40	21%
vmd	16	9%
vad	15	8%
vom	15	8%
va	13	7%
vm	13	7%
vag	12	6%
vdb	12	6%
votd	10	5%
vdO	9	5%
vmdn	9	5%
vadn	7	4%
vadO	7	4%
vodb	7	4%
vdbO	6	3%
vdn	6	3%
vadg	5	3%
vadgwO	5	3%
vadng	5	3%
vomd	5	3%
vtdO	5	3%
vadnO	4	2%
vadwb	4	2%
vdwb	4	2%
vg	4	2%
vodn	4	2%
vodngO	4	2%
vodnO	4	2%
vomdn	4	2%
vomtdO	4	2%
vot	4	2%
vtd	4	2%
vadgO	3	2%
vadgw	3	2%
vadngb	3	2%
vadngw	3	2%
vagO	3	2%
vdg	3	2%
vmdg	3	2%
vmdgO	3	2%
vmdO	3	2%
vodg	3	2%
vodO	3	2%
vrdwb	3	2%
vromtdO	3	2%
vt	3	2%
vtdb	3	2%
vadgb	2	1%
vagb	2	1%
vb	2	1%
vbO	2	1%
vdgb	2	1%
vgO	2	1%
vmdb	2	1%
vO	2	1%
voad	2	1%
vodgb	2	1%
vodngwb	2	1%
vogb	2	1%
vomdgb	2	1%
vomdnO	2	1%
vomdw	2	1%
vomtd	2	1%
von	2	1%
votdwbO	2	1%
votn	2	1%
vr	2	1%
vrd	2	1%
vrdgbO	2	1%
vrdnwO	2	1%
vrdO	2	1%
vrO	2	1%
vrod	2	1%
vrom	2	1%
vromtdbO	2	1%
vromtdg	2	1%
vromtdngwbO	2	1%
vromtdwbO	2	1%
vrotdnwO	2	1%
vrwO	2	1%
vtdn	2	1%
vtdngO	2	1%
od	1	1%
romaO	1	1%
rtd	1	1%
td	1	1%
vab	1	1%
vadb	1	1%
vadgwb	1	1%
vadgwbO	1	1%
vadngO	1	1%

vadngwb	1	1%
vadngwbO	1	1%
vadngwO	1	1%
vadnwbO	1	1%
vagw	1	1%
vang	1	1%
vaO	1	1%
vawbO	1	1%
vdngwO	1	1%
vmdgwb	1	1%
vmdng	1	1%
vmdngw	1	1%
vmdnO	1	1%
vmdnwb	1	1%
vmdwbO	1	1%
vmg	1	1%
vmO	1	1%
vmtd	1	1%
vmtO	1	1%
vn	1	1%
vngw	1	1%
voadg	1	1%
voadn	1	1%
voadwbO	1	1%
vob	1	1%
vodgw	1	1%
vodngb	1	1%
vodngbO	1	1%
vodngwbO	1	1%
vodngwO	1	1%
vodnwbO	1	1%
vodw	1	1%
vodwb	1	1%
vog	1	1%
vogO	1	1%
vogwb	1	1%
voma	1	1%
vomabO	1	1%
vomadwbO	1	1%
vomdb	1	1%
vomdg	1	1%
vomdngO	1	1%
vomdnw	1	1%
vomdnwbO	1	1%
vomdnwO	1	1%
vomdO	1	1%
vomdwbO	1	1%
vomt	1	1%
vomtadngO	1	1%
vomtdngbO	1	1%
vomtdngwbO	1	1%
vomtdnwbO	1	1%
vomtn	1	1%
vongO	1	1%
vonO	1	1%
votdg	1	1%
votdO	1	1%
vrbO	1	1%
vrdb	1	1%
vrdbO	1	1%
vrdg	1	1%
vrdngwbO	1	1%
vrmdbO	1	1%
vrmdwO	1	1%
vrmtdb	1	1%
vrmtdgwbO	1	1%
vrmtdwbO	1	1%
vrodnw	1	1%
vrodwbO	1	1%
vrodwO	1	1%
vromad	1	1%
vromd	1	1%
vromdbO	1	1%
vromtadO	1	1%
vromtdgwbO	1	1%
vromtdgwO	1	1%
vromtdn	1	1%
vromtdngbO	1	1%
vromtdnwbO	1	1%
vromtn	1	1%
vromwbO	1	1%
vrotd	1	1%
vrotdnwbO	1	1%
vrotdwbO	1	1%
vrwbO	1	1%
vtad	1	1%
vtadn	1	1%
vtadO	1	1%
vtdgwb	1	1%
vtdng	1	1%
vtdngb	1	1%
vtdngbO	1	1%
vtdngwbO	1	1%
vtdngwO	1	1%
vtwbO	1	1%
TOTAL	188	100

Appendix 14 Key delivery strategies used during Child Health Week

1. **Utilization of fixed health sites:** Stationary, existing health facilities were encouraged to be accessed to obtain the child survival interventions.

2. **Outreach posts:** Temporary health posts were set up to deliver the health interventions during the event in areas where it was difficult for the communities to reach the stationary health centres.

3. **Door-to-door:** In some cases, where social mobilization efforts were limited due to remote areas or among farmers who were not exposed to social mobilization efforts, community health workers went door-to-door to notify the caregivers about CHWk and encourage them to bring their children to receive the free services.

Appendix 15 Development of adding more interventions to Child Health Week, Zambia (1999-2012)

Year	Interventions delivered	Beneficiary population age group
1999	1. Vitamin A supplementation 2. Routine immunization- BCG, OPV, Pentavalent (DPT-HepB-Hib), measles 3. Growth monitoring and promotion 4. Behaviour change communication (BCC) – key family practices on: • Breastfeeding, infant & young child feeding • Malaria prevention • Diarrhoea prevention • Family planning	Children 6–59 months Children who missed their vaccinations
2002	5. Deworming	Children 1–5 years old
2003	6. Re-treatment or distribution of insecticide treated nets (ITNs)	Pregnant women; children under 5
2005	7. Tetanus toxoid vaccination (2005 only)	Pregnant women; newborns
2008	8. IMCI – treatment of sick children using IMCI guidelines (2008 only) 9. Family planning (2008, 2009)	Sick children; their care-givers Women of reproductive age; men
2009	10. Infant HIV-testing (2009 only)	
2008-2010	11. Nutritional screening (2008-2010)	Malnourished children
2010 2012	12. Measles vaccine (nationwide: 2010, 2012)	Children 9–47 months (2010) Children <15 years old (2012)

Appendix 16 Zambia's measles campaigns

Mass-scale measles campaigns were conducted in Zambia in 2002, 2003, 2007, 2010 and 2012, through which approximately 8 million children were immunized against measles (730,000 in 2002, 5 million in 2003 and 2.2 million in 2007). One of the factors that contributed to the measles outbreak in Zambia was thought by WHO to be longer inter-campaign intervals,[196] as the catch-up measles campaign in Zambia was in 2003, while the follow-up campaign was in 2007. In each of the campaigns, at least 99% of all eligible children obtained a dose of measles vaccination.[279] The MOH of Zambia conducted an EPI coverage survey (2011) which indicates that 91% of children were immunized against measles, 82% with three doses of DTP, and 82% with three doses of Hib (Haemophilus influenza type B) vaccine.

According to WHO,[196] the factors that contributed to the measles outbreak in Zambia were thought to be due to: 1) an epidemiological shift to older age groups; 2) gaps in routine immunization (though Zambia's WHO/UNICEF official measles coverage was 90% (2009), 96% (2010) and 83% (2011)); and 3) longer inter-campaign intervals.

Appendix 17 Example of partners supporting Child Health Weeks, 2005, 2008

<table>
<tr><th colspan="2">2005 National and International Partners</th></tr>
<tr><td>• MOH
• Communities
• UCI unit (under MOH)
• NFNC
• NMCC
• Local Businessmen Men
• Politicians
• Churches and Schools
• Traditional/community leaders
• Local NGO's</td><td>• UNICEF
• WHO
• HSSP
• HCP
• JICA
• PLAN INTERNATIONAL
• WVI
• CARE – ZAMBIA
• GSK
• Community Radio stations</td></tr>
<tr><th colspan="2">2008 – Development Partners</th></tr>
<tr><td colspan="2">• UNICEF
• WHO
• USAID
• CIDA
• MI
• JICA
• CARE
• World Vision
• SIDA</td></tr>
</table>

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